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A SYSTEMATIC CENSUS OF WEST AUSTRALIAN FLORA.

EDITOR.

With the March issue of the "Journal of the Department of Agriculture" is included, in addition to the annual supplementary index to the last Volume, an appendix entitled "Enumeratio Plantarum Australiae Occidentalis," a work compiled by Mr. Chas. A. Gardner, the Government Botanist.

This appendix will form a valuable contribution to the science of Botany throughout the world, for it is worthy of note that no similar publication of this nature has hitherto been issued concerning the flora of the State. The only comprehensive journal attempting to embody the knowledge now diffused is the "Flora Australienesis," issued between the years 1860 and 1878. All other botanical contributions to the literature consist of small books, or odd papers published in very many journals in England, Australia and foreign countries—notably Germany. The student of botany in this country can scarcely hope to accumulate all these; hence the purpose of this census.

Mr. Gardner has succeeded in including the names of all plants occurring within the political borders of the State in systematic order, and in such a manner that all closely related plants are brought together. The student, comparing Bentham's work ("Flora Australienesis") with the census now issued, would find in the latter names that do not occur in the former publication, and from their position or sequential order would be able to trace the description. The name of each species is followed by that of the person who described it, or the later authority who revised the name, followed again by the title of the periodical, paper, journal, or whatever it may be, in which the description may be found, together with the date of its publication. Wherever a name has a synonym it is included in italics, with brackets. Each genus is numbered in sequential order.

The census also includes all the exotic, naturalised species that have been recorded up to the present time, the genera of which are not numbered, but given in sequential order. The paper in which they are described is not mentioned, but the original home of each species is given in Latin. The name of each introduced plant is also preceded by an asterisk, and may be thus easily picked out.

The census has been in course of preparation since 1923, and every care has been exercised regarding the correct name and status of each species. The system followed is that in general use amongst botanists, being that of Engler, the famous German.

It is not contended that this work will be of particular value to the agriculturist or pastoralist, although something more than a superficial knowledge of the subject would be to their advantage, and, if included in their libraries for ready reference, there cannot fail to arise occasions when it will be found extremely useful. Readers of the "Journal," however, now cover a wide range throughout the Commonwealth and far beyond the limits of the Australian continent, and to many of them the census will be of far more than passing interest. By the botanist and student it will be welcomed and appreciated. For this reason, and that it constitutes in part a record of the work carried out by the Department of Agriculture for Western Australia, this publication takes pleasure in being the first medium to introduce this patiently compiled and comprehensive census to its reading public.

It is hoped to publish the work in four separate parts as an appendix, or supplement, to the quarterly issue, and the volume will be completed with the December number.

"THE JOURNAL OF AGRICULTURE"

will be supplied free *on application* to any person in the State who is following Agricultural, Horticultural, or Viticultural pursuits, to Agricultural Societies or Associations, and to any person otherwise interested in Agriculture.

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HISTORICAL.

A SHORT HORTICULTURAL AND AGRICULTURAL HISTORY OF THE PROGRESS OF ALBANY, MT. BARKER, AND THE ADJOINING DISTRICTS.

By A. C. VAUGHAN.

Though celebrating the Centenary Year of Western Australia, the progress of horticulture and agriculture in the above-mentioned districts has increased more rapidly during the last twenty-five years than in the seventy-five which preceded them, and it is with the latter part of the last quarter of a century this article proposes mainly to deal.

Horticulture has been largely responsible for developing the prosperity of these districts, and still holds its own from a viewpoint of production, for it was early realised that climatic conditions and suitability of soil were favourable to the planting of orchards, especially for the production of pip fruits.

When the opening up of the goldfields brought about an influx of population a good local market was created; it was recognised that conditions were favourable, with the result that the fruit growing industry went ahead. Thirty years ago there were few people who realised how important this industry was to become to Albany and its environs, yet to-day about one-third of the apple crop of the State is grown within their boundaries, and during this Centenary Year 223,128 cases of apples and 14,990 bushels of pears were exported overseas, necessitating nine ships calling at the Port of Albany. Besides this a large number of cases were sent to the Eastern States.

Years ago it was made apparent that cool storage had become a necessity and the Government came to the assistance of the growers by erecting one at Albany. Private enterprise followed the lead, and at Mt. Barker the Co-operative Fruit-growers of that district put up a very fine store. Both of these adjuncts have been of immense value to growers.

How the industry will increase in the next century one would be foolish to forecast, and will doubtless be governed by the demand for the product, but it is certain we have thousands of acres suitable for producing the best fruit that can be grown. At Mt. Barker, the leading centre, large areas of trees have been planted. The Mt. Barker Estate, now owned by Messrs. Martin Bros., has over 200 acres of orchard; Messrs. Sounnes and Sons well over 100 acres, and Mr. E. Thomas also over 100; while there are several orchards comprising 50 acres or more. The King and Kalgan River Districts have some nice orchards, while Kendenup, Torbay and Denmark also produce good fruit.

Since the export of fruit commenced the demand has been good. For the last three years overseas merchants have been buying at good prices f.o.b. Albany, the 1929 quotes being the highest yet offered. It looks, therefore, as if the fruit produced can hold its own in the world's markets. The comparative freedom from diseases is a big factor and the envy of Eastern visitors. Our Plant Diseases Act and its administration may justly be held largely responsible for this, and the growers of to-day have distinct advantages over those of thirty years ago as far as knowledge is concerned.

There has been no boom in planting in recent years, but production has steadily increased and promises to continue, Kendenup being the most

recent centre to plant extent of acreage, where the young orchards, just coming into bearing, look very well.

The history of the districts reviewed shows that fruit growing has been sound and profitable. While the future of the industry seems bright, there are indications that land development will depend on sound combinations of two or more industries proved suitable for certain districts. Mt. Barker and adjacent lands have proved their suitability for fruit growing, and are now proving that they have a second sound proposition in the cultivation of pasture.

It is very nice to be able to specialise in one industry, but the old saying, "Never have all your eggs in one basket," has a lot of followers. Pasture means production of wool, meat, hides, cream, etc., for all of which there is an assured market, allowing the farmer to go in for sheep or cattle, according to his inclination, the suitability of his land and its type. Mt. Barker is favouring fruit and sheep, and what may be described as standard farms are being evolved on the lines mentioned, either fruit or sheep predominating. Districts further South are favouring dairying and fruit, and potato growing.

The big drawbacks to settlement in timber country are cost of clearing and slowness of return whether the land is eventually to be used for horticulture or agriculture. The keynote of success is to cheapen capital costs and start on sound lines. For this three things are essential, viz., skill in clearing, a knowledge of manuring and soil improvement, and growing the right type of plant for the soil and climatic conditions.

It is admitted in horticulture—and applies also to agriculture in timber districts—that it is inadvisable to plant green country for cropping purposes. A system is now in practice which, though not perhaps generally accepted, promises to be of great value as a starting point in reducing capital costs and developing on sound lines. This is chiefly, in addition to ring-barking and suckering, sowing suitable seeds, mostly clovers, and top dressing with manure, with or without some sort of cultivation. The suckered green country treated in this way can be made to show a small return in the first year. This refers to country carrying principally Wandoo or White Gum timber.

The system being practised allows of several variations of method necessary to suit different kinds of country and the final purpose for which the land is to be tilled. Where Jarrah or Red Gum predominates, the country is ring-barked and small saplings and scrub cut down, and every effort made to get what is called a clean burn. This is followed up by sowing seeds and manure. The seeds should not be sown too early or they may germinate and wilt. Superphosphate at the rate of one bag per acre is recommended, with subterranean clover at the rate of 4-6 lbs. per acre in the seed mixture. In most places the choice of seed would include subterranean clover, but cluster, suckling, and drooping clover have proved their value for this type of work. Then by judicious grazing one can get a small quick return, as the clovers, with the natural herbage which exists in most country give quite a fair picking the first year. Top dressing and suckering follow for such period as is necessary. Soil improvement is commenced, and in a few years the country can be cleared at a low cost, and when ploughed is fit for horticultural or agricultural purposes. Of course much of the poorer country will be kept for permanent pastures, but this work is likely to have a bearing on present classification and soil surveys and make profitable thousands of acres of land already provided with public facilities.

EXPORT OF EGGS.

REJECTS—THEIR CAUSES AND REMEDY.

By W. T. RICHARDSON,
Poultry Adviser and Commonwealth Officer in Charge of Export of Eggs.

The export of eggs overseas is subject to Regulations issued by the Commonwealth Government under the Customs Act, 1901-1925, and the Commercial (Trade Descriptions) Act, 1901-1925, and include both eggs in shell and egg pulp.

Eggs had been exported to England for a number of years prior to these regulations coming into force. They were packed in cases, on the farm, without supervision, and sent to the shipping agents for shipment. The first season the above regulations came into force (1927) showed how justified they were on account of the heavy rejects, through various causes, mainly dirty eggs. One can therefore picture the condition of previous export efforts.

Inspectors are now appointed whose duty it is to inspect all eggs submitted for export at the various approved packing sheds, and reject those not complying with regulation requirements. As "the exportation of eggs and egg pulp is prohibited unless such goods have first been graded and packed to the satisfaction of an officer of Customs in accordance with Regulations" (Proclamation 22/9/27).

Large numbers of poultry farmers not conversant with export requirements have suffered heavy rejects. Every successive season has been a marked improvement in the general condition of the eggs submitted for inspection.

To comply with English requirements the word "Australia" (country of origin) must now be stamped on every individual egg exported.

The Cause of Rejects has been—

Dirty eggs, which include:

Eggs soiled with fowl excreta.

Eggs soiled through breakages in transit to the packing sheds.

Soiled through rust and grit picked up in transit and deposited on the dies of the fillers and on the "flats." Such eggs show rings of dust of varying magnitude, ground into the shell, also soiled ends (those resting on the flats).

Yellow stains, caused by damp litter in the nests or houses, damp floors, excreta, damp ground, etc.

Toe marks on the eggs.

Eggs with chaff, sand, sawdust, etc., adhering to them.

Eggs wiped with damp, dirty cloths that leave dirty streaks on the shell.

According to the Act the definition of "clean" reads as follows: "Clean, in relation to eggs in shell, means free from stain, dirt, or other foreign matter, but does not include eggs which have been washed." This is a definite instruction and does not allow for the very elastic interpretation of "reasonably" clean. What may appear reasonably clean to the producer or seller may not appear so to the purchaser.

It is difficult to have clean eggs (unwashed) during the winter months, unless proper housing for the laying birds is provided, with deep clean litter on raised, dry floors, clean resting material, etc., where the birds may be confined when necessary. Clay or loamy soils will aggravate this disability. The semi-intensive or intensive system of housing will help to solve this trouble. Eggs intended for export should be gathered at least twice a day.

Soiled eggs may be wiped with a clean damp cloth. Eggs showing evidence of washing in water are rejected.

When in transit, by road, the eggs should be well covered with a sheet or bags to protect them from dust as well as from rain or sun.

Stale Eggs:

Eggs with large air cells (indicates staleness) applies mostly to "country" eggs.

Eggs showing evidence of incubation.

Eggs with olive coloured yolks (a disease caused by bacteria that renders the egg unfit for human consumption).

Eggs with blood spots.

Eggs with the above defects are noted and rejected by the packing shed staff during the candling process. Any doubtful eggs are submitted to the Inspector for his decision.

Large quantities of stale country eggs (mostly "floor" eggs not intended for export) were rejected last season, which, otherwise, may have been exportable. Holding eggs by country producers or storekeepers is responsible for this condition. Partly incubated eggs should not find their way to the packing sheds. One particularly bad lot (incubator rejects) came from a farm within the metropolitan suburban area, marked "for export." Olive coloured yolks were very limited in numbers.

A greater percentage of eggs with blood spots came from the Fremantle district than from any other district, possibly due to overstimulating feeding.

Eggs with broken, unsound, or abnormal shells:

Broken eggs were numerous, through—

(a) careless handling of cases in transit;

(b) eggs too long for the fillers;

(c) eggs too stout for the fillers;

(d) thin-shelled eggs.

Cracked eggs, not noticeable except by candling.

Chalky shells (few in number).

Thin shells—a general fault that got worse as the season advanced. Some producers had heavy rejects on this score.

Abnormal shells, i.e., rough ridges round or partly round the egg, flat on one side; round eggs (cricket ball like), long thin eggs (torpedo shaped).

In this respect Regulations state: "No egg which has a broken or damaged shell, or which is in unsound or other abnormal condition, shall be packed."

With regard to broken eggs, greater care in the handling and carrying of eggs from the farm to the packing shed is self suggestive. Eggs too long for the fillers should not be submitted for export, as they are liable to get broken. A broken egg may soil a number of others in the case. When packing, if the hand is passed over each "flat," any eggs too long for the filler will be readily felt. Withdraw such eggs and replace them by others of suitable length. Eggs too stout for the fillers may break when packed on the farm or at the packing shed.

During the past export season the greatest percentage of rejects was due to shell weakness (thin shells). Eggs of this nature generally denote a deficiency in shell-forming material. Shell grit alone will not supply the necessary requirements during periods of heavy production. Those producers that followed the advice given them greatly improved the texture of the egg shells by adding 5 per cent. bone meal to the daily mash.

Mixing long, thin, or otherwise abnormal eggs with normal shaped ones spoils the uniform appearance of the pack and leads to their rejection.

Incorrect grading.

Laxity in this respect on the part of some producers has been so consistent that the Inspectors have had to refuse inspection of numerous case lots on account of poor or apparently no attempt at grading, unless regraded by the packing-shed staff. Producers must realise that the cost of candling, packing, etc., is pooled for the season and is a charge against them, therefore the careless person, whose eggs have to be regraded, is imposing on the producer who takes a pride in the quality and grade of egg submitted, by making him share in the extra cost of regrading. It is not the duty of an Inspector to regrade eggs, as will be seen by reference to the Proclamation quoted.

The various exportable grades are subject to a maximum and a minimum weight of egg, also to a minimum weight per each ten dozen eggs, and an Inspector cannot refuse to pass any of the gazetted grades provided they comply with the provisions of the Act. It is advisable to mention, in order to dispel erroneous impressions, that the cost of supervision and inspection connected with the export of eggs is solely borne by the Commonwealth Government, and therefore is not a charge against the egg producers.

With the object of assisting the producers to improve the condition, quality, grade, etc., of their product, and in order to help them submit the greatest number of exportable eggs, the Inspectors keep a detailed record of every parcel of eggs from each individual producer showing the nature of every reject.

These records, which are purely voluntary and involve a considerable amount of work, are available only to the producers concerned during the export season. It is regrettable that too many of them are content to forward to the packing sheds the same class of egg, with the same heavy rejects, week after week, without endeavouring to ascertain the cause, and its remedy, if any.

At the same time, a tribute must be paid to those poultry farmers who take a pride in the quality, appearance, etc., of their eggs, and suffer few rejects in consequence.

SEED TESTING.

ITS VALUE TO THE FARMER.

H. G. ELLIOTT, Dip. Agric.,
Assistant Plant Pathologist.

Owing to the extent of the development of world-wide competition in agricultural production during the past few years, the farmer has to eliminate every element of chance in farming practices to strengthen his position in this struggle.

The modern farmer cannot, to-day, use the out-of-date methods which were excusable in the early days, for then the cost of production was less while competition was negligible. Those obsolete methods should no longer be practised,—conditions are different, prices of seed higher and labour more expensive; in fact, the cost of production is greater in almost every respect, and consequently profits tend to diminish. An important factor in ensuring an increase of profits is the use of agricultural seeds of only good quality. This implies seed testing previous to buying or sowing.

The testing of seeds before sowing is by no means an innovation in the history of agricultural progress. As early as 1869 the first *Seed Control Station* was initiated by Dr. Nobbé in Saxony, and since that time similar stations have gradually extended over Europe. Two of the most outstanding are at Zurich (Switzerland) and Copenhagen (Denmark). These are regarded as the word's leading establishments in seed testing and much valuable research work has been done at both. Great Britain, Ireland, Canada, U.S.A., New Zealand and Australia have also been testing seed to a greater or less extent for many years. They each have established one or more seed testing stations.

Before the introduction of seed testing, farmers knew very little about the quality of the seed they bought for sowing. Scientific methods for ascertaining their value were unknown, consequenty they had to rely on simple unorthodox tests, such as appearance, smell, size and taste. These doubtful means of discrimination did not, however, satisfactorily demonstrate their value, as that can only be accurately determined by scientific testing.

It is essential for the farmer to understand that a good sample of seed should contain the largest possible quantity of the seed of the plant desired for growing, and consequently freedom from seeds of undesirable plants and inert matter such as chaff, soil particles, etc.,—in other words *as high a percentage of purity as can be obtained;* combined with this the seed should be capable of vigorous growth, *i.e.* should give *a high percentage of germination.*

It frequently occurs (and the explanation often troubles the farmers) that, after spending much time and money they obtain very disappointing crops, accompanied by a good stand of weeds many of which may be new to their areas. They do not always realise that the fault may be in the seed sown, and that the only way to safeguard against this is to have all the seed which is bought tested, or only to buy guaranteed tested samples. The introduction of new weeds on to a farm is serious, and should be avoided if possible. Unfortunately most weeds are free seeders (thereby producing a further heavier infestation next season) and loss in time and money eventually occurs in eradicating them.

The following points with respect to the purchase of seed should be considered by all farmers:—

1. Suitability for district, particularly as to kind and variety.
2. Freedom from and resistance to diseases.
3. Quality.
4. Purity.
5. Germination.

It is very probable that most growers consider the first before buying, but with regard to the others, it is certain that they are frequently overlooked. Progressive farmers, who recognise the importance of better and more profitable crop production, must realise, however, that the careful selection of seed under the points above enumerated is worthy of their attention.

This article is written with the purpose of encouraging farmers to buy and use the best seeds, also to convince them that they have no justification whatever for buying and using cheap and inferior seeds with a high proportion of weed seeds. The main points to be borne in mind are—

1. Seeds of some crops are unavoidably mixed with seeds of some undesirable weeds, which, when sown may gain the upper hand and reduce the stand of the main crop, consequently they will necessitate labour and expense in eradication to prevent permanent injury to the farm.
2. Old seed, which may have a low germination capacity, results in a poor crop, the field having throughout only scattered plants.
3. Seeds may have low germinating capacity, due to—
   (a) Unfavourable conditions during the development, harvesting, and storage of the seed; or
   (b) Seed that has been kept too long, *i.e.*, old age.
4. Seeds of certain crops such as lucerne, clovers, grasses, etc., found for sale, usually come from overseas countries which may have a vastly different climate to that under which they would be grown in this State, the ultimate results being reduction in yield of crop and carrying capacity of the pastures.

In the selection of seeds the following points should be looked for:—size, colour, plumpness, brightness (and occasionally smell), but it is not always easy to judge by the eye. Something more than good appearance is needed, and that is *high percentage purity and germination.*

In conclusion, the following points should be given careful consideration:—

Buy on tested samples and obtain a statement as to percentage purity and germination, which will tell what proportion of the bulk of the seed is true to name; note the nature of the impurities and especially the amount of weed seeds present. The germination will show the percentage of pure seeds which are capable of growth.

Avoid cheap seeds unless there is definite proof to show they are good, as *cheapness and inferiority* generally go together.

THE "ROYAL" AND DISTRICT AGRICULTURAL SOCIETIES' CROP COMPETITIONS.

I. THOMAS,
Superintendent of Wheat Farms.

The Royal Agricultural Society has promoted, during the past six years, competitions for wheat crops of not less than 50 acres of any one variety throughout the wheat belt.

For the purpose of the competition the wheat belt of the State was, as in former years, divided into eight zones. Formerly the zones were numbered one to eight. This, however, did not permit of the Esperance and Ravensthorpe districts taking an active interest in the competition as their climatic and other conditions differed greatly from those prevailing in the existing zones. In past competitions the competitors in Zone 6 were few. In view of this apparent lack of interest, and in order to create a new zone (No. 9) to embrace the Esperance and Ravensthorpe areas without increasing the number of zones, it was decided this year to include in Zone 8 the districts formerly in Zone 6.

The eight zones into which the wheat belt is divided are as shown in the accompanying map.

In each of the eight zones a championship prize is awarded: also a prize is awarded for the runner-up. Those competitors eligible for these prizes are the first and second prize winners of the competitions held by the affiliated district Agricultural Societies conducting crop competitions in accordance with the Royal Agricultural Society's conditions.

In some districts the Agricultural Societies make no provision for crop competitions, and in order to prevent farmers who are located in such districts being debarred from competing for the championship prizes in their respective zones, the Royal Agricultural Society accepts entries direct.

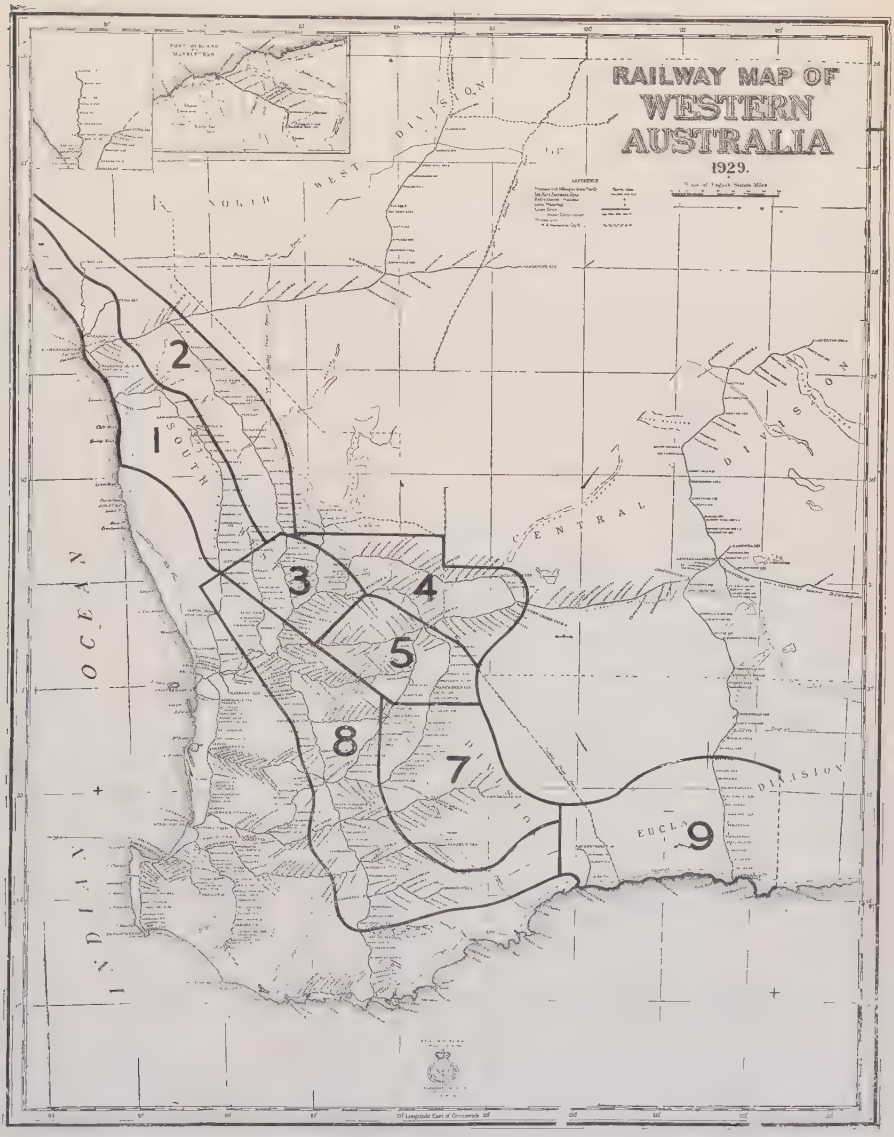
The conditions of the competitions require that the crop shall be grown on fallowed land, shall not be less than 50 acres in area, of one variety, and shall be judged according to the scale of points set out below.

The practice in past competitions has been to allow one point for each calculated bushel of yield. It was realised, however, that this practice could not be continued without the scale of points being modified. It was decided, therefore, to make alterations in the scale of points under which the competition was judged to enable the present practice to be continued. The alterations made are as hereunder:—

	Old Scale.	New Scale.
Yield	40	50
Freedom from weeds	20	10
Freedom from disease	15	10
Freedom from admixture	15	15
Evenness of growth	10	15
	100	100

The points awarded for yield are not based upon the estimated yield, but upon that calculated from portions of the crop obtained from small areas taken systematically throughout the crop. These portions of the crop are threshed and the grain weighed.

The judges of the Royal Crop Competitions since their inception have been departmental officers attached to the Wheat Branch, and the same officers have also judged the majority of the district competitions. As it is



obviously desirable that all the crops in any one zone should be inspected and the awards for the championship prizes made by the same judge, and as it is the definite and strong wish of many district societies that departmental officers should continue to judge their competitions, the zones are arranged

so that the Societies which are adjacent to each other and which have similar interests and climatic conditions are grouped together. The competitors were located at centres extending from Indarra in the North to Esperance and Ravensthorpe in the South, and in order to complete the judging in the limited time available, six officers of the Wheat Branch were engaged on the work.

ZONE 1.

Judge—F. L. SHIER, B.Sc.(Agric.), Agricultural Adviser.

In this zone seven entries were received directly through the Royal Agricultural Society, all of which were in the Carnamah district. The general lack of interest in these competitions in this zone, one of the finest wheat-producing districts in the State, is very hard to understand.

The points awarded to the various competitors are shown in the table hereunder:—

ROYAL AGRICULTURAL SOCIETY.
ZONE 1.
Judge—F. L. SHIER, S.Bc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 points.
Lucas, F. ...	Carnamah ...	Nabawa ...	27	9	9	14	13	72
Forrester, J. K.	Carnamah ...	Bena ...	26	9	9	14	13	71
Robertson, R.	Carnamah ...	Merredin ...	25	8	9	14	13	69
Bowman, J. ...	Carnamah ...	Merredin ...	26	8	7	14	13	68
Johnson, I. ...	Winchester ...	Nabawa ...	24	8	9	14	13	68
Cuming Bros. ...	Carnamah ...	Nabawa ...	23	8	8	13	13	65
Green Bros. ...	Carnamah ...	Merredin ...	22	8	8	14	13	65

Generally speaking the crops were not up to their usual high standard, the average of the seven competitors being just under 25 bushels, being due, no doubt, to the very light rains in August, September and October.

Below is given the rainfall for 1929:—

——	Jan.	Feb.	Mar.	Apl.	Useful rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Carnamah	26	113	22	8	352	424	214	121	35	24	1,171	118	...	1,458

The winning crop of Mr. F. Lucas, Inering, Carnamah, was of the Nabawah variety and was calculated to yield 27 bushels per acre. It was well stooled and headed and of a nice even height. Very few weeds and admixture were present. Except for an odd small patch of Takeall, it was very free from disease.

The entry gaining second prize was Mr. J. K. Forrester's crop of Bena, and was calculated to yield 26 bushels per acre. Early in the season this crop gave promise of being an exceptionally high yielding one, but owing to the light spring rainfall the crop suffered considerably, the heads not filling out well, and in some places being tipped.

It had stooled very heavily, and was very free from weeds or foreign heads. No disease was noticed.

A table showing details of the cultural methods employed by the various competitors appears on the next page.

CULTURAL DETAILS.

Competitor.	No. of years cropped.	Land and Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
Johnson, Ivan ...	3 years. 1 fallow	Heavy loam. Salmon Gum	June, 1928	Disc.	ins. 3½–4	Cross disced August, springtyne cultivated October and again Dec. Planted with combined cultivator-drill	Nabawa	Mid May ...	45	120	Dry	Re-cleaned	
Cuming, A. ...	8	Salmon and Gimlet	July	Disc.	ins. 3½–4	Twice springtyne cultivated and planted with combined cultivator-drill	Nabawa	1st week May	55–60	112	Dry	Yes	Trace, Ball Smut.
Green Bros. ...	Cleared abt. 16 years, cropped 6 times	Heavy red loam, York Gum	July, 1928	Disc	ins. 3	Drilled with combined cultivator-drill	Merredin	3rd week May	50	100	No	No	Traces, Ball Smut, Flying Smut, and Takeall
Lucas, F. ...	4	Quartzy clay. Salmon, Gimlet and York Gum	June, July	Part mould-board, part disc	ins. 4	Ploughed back Aug. springtyne cultivated Sept. Planted with a combined cultivator-drill	Nabawa	1st week May	50	112	Dry	Yes	Trace, Take-all.
Forrester, J. K.	New land	Heavy red loam. York Gum	July, 1928	Disc	ins. 4	Springtyne cultivated end Sept. Planted with combined cultivator-drill	Bena	1st week May	48	93	Dry	Yes	
Robertson, R. ...	6th or 7th crop Cleared 13 years	Heavy loam. Salmon, Gimlet and York Gum	August	Half disc, half mould-board	ins. 4	Tandem disc cultivated September. Sundercut May. Planted with combined cultivator-drill	Merredin	Last week May	45–50	90	Dry	Yes	
Bowman, J. ...	6–8 crops	York Gum and Teatree	August	Disc	ins. 4	Twice disced spring, springtyne cultivated and harrowed before seeding	Merredin	Mid May ...	60	100	Dry	Yes	Traces, Take-all and Ball Smut

ZONE 2.

Judge——F. L. SHIER, B.Sc.(Agric.), Agricultural Adviser.

Entries for this zone were received through the Dalwallinu Agricultural Society, while one competitor, Mr. T. Moore, Indarra, entered directly with the Royal Agricultural Society.

DALWALLINU AGRICULTURAL SOCIETY.

A very gratifying feature this year was that of the 16 entries received by the Society, 14 remained for the judge's inspection. They comprised crops in Dalwallinu, Pithara, Ballidu and Xantippe on the Rabbit-proof Fence about 25 miles East of Dalwallinu. Generally speaking the crops throughout these districts were much better than in 1928, due no doubt to the better rainfall in 1929.

Dalwallinu Rainfall.

——	Jan.	Feb.	Mar.	Apl.	Useful rains.							Nov.	Dec.	Total for year.
					May	June.	July.	Aug.	Sept.	Oct.	Total.			
1928 ...	49	...	13	42	136	128	307	168	93	48	880	...	74	1,056
1929 ...	20	165	29	3	403	330	164	82	15	123	1,117	78	3	1.415

Excellent May and June rains were recorded, whilst that in July (162 points) following the previous two months, was sufficient, but the falls decreased towards the end of the growing periood, September (15 points) and October (23 points) being particularly light. Despite this, the average yield of all competitors was 22 bushels, which is indeed very creditable. Had good falls been experienced in September and October a record harvest undoubtedly would have resulted.

Sheep are becoming more in evidence in these districts and the benefit to be derived from them will soon be felt, especially on the weedy morrell soils.

The most popular variety in this district is Gluyas Early because of its drought resistance and earliness, whereby good crops are obtained under very light rainfall. This variety is very subject, however, to Flag Smut, and this disease was noticed in every crop of Gluyas Early examined. The methods of controlling this disease are dealt with later.

The points awarded to the various competitors are shown in the table hereunder:—

DALWALLINU AGRICULTURAL SOCIETY.

ZONE 2.

Judge—F. L. SHIER, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 points.
Bradford Bros....	Ballidu ...	Gluyas Early	29	9	9	14	13	74
Beilby, A. H. ...	Ballidu ...	Gluyas Early	26	9	9	14	14	72
Locke, F. C. ...	Dalwallinu ...	Merredin ...	25	9	8	13	14	69
Honner & Sons	Dalwallinu ...	Gluyas Early	24	9	9	13	13	68
Locke, J. ...	Pithara ...	Merredin ...	23	8	8	14	14	67
Locke, H. ...	Pithara ...	Golden King	25	8	7	13	13	66
Anderson, H. W.	Pithara ...	Merredin ...	22	9	7	13	14	65
Sawyer, W. H.	Xantippe ...	Nabawa ...	19	9	9	14	14	65
Sutherland Bros.	Pithara ...	Nabawa ...	21	8	8	13	14	64
McNeill, C. ...	Dalwallinu ...	Gluyas Early	20	9	8	14	13	64
Wilson & Son ...	Dalwallinu ...	Gluyas Early	20	9	8	14	13	64
Sawyer, J. H. ...	Dalwallinu ...	Nabawa ...	22	7	8	13	13	63
Bussell, D. ...	Xantippe ...	Merredin ...	18	9	8	14	14	63
Hinkley & Sons	Xantippe ...	Nabawa ...	16	9	9	14	13	61

The winning crop of Messrs. Bradford Bros. was of the Gluyas Early variety and was calculated to yield 29 bushels per acre. It had stooled well, was of a nice stripping height and well headed. Except for an odd mustard, it was free from weeds, but a trace of the disease Flag Smut was present.

The crop gaining second prize, of Mr. A. H. Beilby, was also Gluyas Early and was calculated to yield 26 bushels per acre. It was very even, free from weeds and strange heads, but a trace of Flag Smut was noticed.

The cultural methods as employed by the various competitors are shown in the following table:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Land and Timber.	When fallowed.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
Bradford Bros.	6, 3 fallows	Salmon, Gimlet and Morrel	June–July	Disc	ins. 4	Springtyne cultivated Sept., and again during summer. Planted with combined cultivator-drill	Gluyas Early	Mid May ...	55	90	Dry	Re-cleaned	Odd trace Flag Smut.
Beilby, A. H. ...	5	Red loam. Salmon, Gimlet, and Morrel	July	Disc	4–6	Springtyne cultivated four times during spring and early summer, and again before drilling	Gluyas Early	Mid May ...	50	112	Dry	Re-cleaned	Odd Flag Smut.
Locke, F. C. ...	7	Salmon, Gimlet and Morrel	July	Mould-board	3½–4	Springtyne cultivated Sept. Harrowed Dec., and springtyned prior to drilling	Merredin	Mid May ...	55	90	Dry	Yes	Ball Smut and Takeall
Honner & Sons	5 crops, 2 fallows, 1 pasture year	Salmon and Gimlet	Early July	Mould-board	4	Cross disced Sept., twice springtyne cultivated and three harrowings spring and early summer. Springtyne cultivated in front of drill.	Gluyas Early	Mid May ...	45	112	Dry	Yes	...
Locke, J. ...	5 crops	Salmon and Gimlet	Sept.	Disc	3½	Half cultivated prior to seeding. Planted with combined cultivator-drill	Merredin	End April ...	53	60	Dry	Cleaned	Trace Takeall and Ball Smut
Locke, Alan ...	4 crops, 1 fallow	Heavy red clay. Salmon, Gimlet mainly; trace Morrel	June	Mould-board	4	Springtyne cultivated three times during spring, and harrowed twice summer. Planted with combined cultivator-drill	Golden King	1st week May	48	80	Dry	Yes	Ball Smut and Flag Smut.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Land and Timber.	When fallowed.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
					ins.								
Anderson, H. W.	7 crops, 3 fallows	Medium red loam. Gimlet and Scrub	July	Disc	3½	Springtyne cultivated, then harrowed during spring. Cultivated before drilling	Merredin	2nd week May	50	75–80	Dry	Yes	Flag Smut and trace Takeall and loose Smut.
Sawyer, W. H.	2	Morrel, Gimlet and Teatree	June-July	Disc	3½	...	Nabawa	End April ...	50	60	Dry	Re-cleaned	Trace Ball Smut and Takeall.
Sutherland Bros.	Unknown	Quartz, red loam. Giant Teatree, Gimlet and Morrel	August	Disc	3½–4	Springtyne cultivated Sept. Harrowed October and February. Cultivated in front of drill	Nabawa	Mid May ...	50	100	Dry	Re-cleaned	Trace Ball Smut and Takeall.
McNeill, C. H. ...	About 10 pasture fallow crop last 3 years	Salmon and Morrel	July	Mould-board	4	Disced September	Gluyas Early	Mid April ...	50	50	Dry	Yes	Trace Flag Smut.
Wilson, H. E. & Son	3rd crop 2nd fallow	Medium red loam Salmon and Morrel	July	Mould-board	4	Springtyne cultivated twice during spring. Harrowed summer. Planted with combined cultivator-drill	Gluyas Early	2nd week May	50	70	Dry	Yes	Trace Ball Smut and Flag Smut.
Sawyer, J. H. ...	Since 1916 fallow wheat rotation	Salmon, Gimlet and York Gum	August	Mould-board	3½–4	Springtyne cultivated in September and before drilling	Nabawa	Last week April	60	80	Dry	Re-cleaned	Ball Smut and Takeall.
Bussell, D. ...	1	Gimlet and Teatree	July	Disc	3½	...	Merredin	Mid April ...	55	60	...	Cleaned	Trace Ball Smut.
Hinkley & Sons	2	Gimlet, Teatree, Scrub	June	Disc	3½	Cultivated before seeding. Planted with combined cultivator-drill	Nabawa	June	50	75	Dry	Re-cleaned.	...

ROYAL AGRICULTURAL SOCIETY.

The only entry received direct by the Royal Agricultural Society was that of Mr. T. Moore, Indarra. The award is as follows:—

ROYAL AGRICULTURAL SOCIETY,

ZONE 2.

Judge—F. L. SHIER, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Moore, T. ...	Indarra ...	Nabawa ...	27	9	9	14	14	73

This award of 73 points places Mr. T. Moore second for the Royal Agricultural Society zone prize. His crop of Nabawa was an exceedingly fine one and was calculated to yield 27 bushels per acre. It was very even, had stooled well and had well filled heads. No disease was present and it was very free from weeds and foreign heads. The crop was sown on medium red loam, originally carrying York Gum timber, at the end of April with a combined cultivator drill, sowing 60 lbs. of ungraded, dry pickled seed and 90 lbs. of super. The land was disc ploughed in June, 1928, 4 inches deep, harrowed in July and springtyne cultivated in December and again in February.

ZONE 3.

Judge—A. S. WILD, B.Sc. (Agric.), Agricultural Adviser.

Four district Agricultural Societies conducted crop competitions in this Zone. The competitors in two, viz., Dowerin and Wongan Hills, were eligible for competition for the Zone championship prizes. However, entries were received by the Royal Agricultural Society from the Goomalling and Wyalkatchem Agricultural Societies too late to be accepted.

DOWERIN AGRICULTURAL SOCIETY.

Of the thirteen entrants in the competition of the above Society, eleven submitted crops for inspection, the awards being as follow:—

DOWERIN DISTRICT AGRICULTURAL SOCIETY.

ZONE 3.

Judge—A. S. WILD, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 points.
G. J. Williams ...	Hindmarsh ...	Gluyas Early	26	8	8	13	14	69
E. C. Cosh ...	Minnivale ...	Nabawa ...	24	9	9	13	13	68
Hughes, J. ...	Minnivale ...	Nabawa ...	24	8	9	14	12	67
Anderson, J. S.	Dowerin ...	Pusa ...	23	8	9	12	14	66
Jones, J. S. ...	Ejanding ...	Gluyas Early	23	8	8	14	12	65
Jones, A. ...	Ejanding ...	Nabawa ...	22	8	8	14	12	64
Don, G. ...	Hindmarsh ...	Nabawa ...	22	7	8	13	13	63
Bear, H. E. ...	Minnivale ...	Gluyas Early	20	8	8	14	12	62
O'Loughlan, M.	Minnivale ...	Gluyas Early	20	8	8	13	12	61
Thomas, T. ...	Dowerin ...	Nabawa ...	18	8	9	14	12	61
McKinnon, W.	Dowerin ...	Gluyas Early	18	7	8	12	13	58

The crop of Mr. G. J. Williams was awarded first place with a total of 69 points, the calculated yield being 26 bushels per acre. This crop had been planted on land ploughed during early July of the previous year. At the end of August the fallow had been springtyne cultivated and harrowed early in September. It was further springtyne cultivated after rain in March. The crop was planted with a combined cultivator-drill with light drag harrows attached. This operation took place during the third week in May, 45 lbs. of seed and 75 lbs. of superphosphate being applied.

The rainfalls as recorded at the various centres in the district during the year were as follow:—

—	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Dowerin	17	175	81	...	335	418	102	104	34	42	1,125	71	3	1,472
Ejanding	28	233	42	...	280	348	114	122	12	44	920	102	2	1,327
Minnivale	19	165	47	...	299	369	106	112	28	77	1,011	100	3	1,345

The cultural methods of the various competitors are summarised as follows:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Williams, G. J....	Old land ...	Salmon and gimlet	Early July	Good ...	Disc ...	3½–4	Springtyne cultivated end of August; harrowed early September. Springtyne cultivated in March after rain. Drilled with combined cultivator-drill with light harrows attached	Gluyas Early	15th to 20th May	45	75	Dry	No	Traces Flag Smut and Ball Smut.
Cosh, E. C. ...	1	Salmon, Gimlet and Teatree scrub	July	Good ...	Disc ...	3	Springtyne cultivated in September, again in October and again before seeding	Nabawa	1st May week	45	100	Dry	Recleaned	
Hughes, J. ...	Old land ...	Gimlet and Mallee	August	Hard in places	Mould-board and disc	4	Disced 2in. deep in September. Springtyne cultivated in February after rain. Scarified immediately prior to seeding. Drilled with combined cultivator drill, with light drag harrows attached	Nabawa	2nd week May	45	100	Dry	Yes	
Anderson, J. S.	Old land ...	Morrel running to Salmon Gum and Gimlet	August	Dry ...	Mould-board	3½–4	Harrowed twice in spring. Springtyne cultivated in May. Drilled with combined cultivator-drill. Harrowed twice just after seeding	Pusa	2nd week June	60	90	Dry	Yes	

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Jones, J. S. ...	About 8 ...	Chiefly Morrel	July	Good ...	Mouldboard	2½	Springtyne cultivated twice in September and again in March after rain. Drilled with combined cultivator-drill and harrowed immediately after	Gluyas Early	1st week June	60	90	No—Stud plot dry pickled	Yes	Flag Smut.
Jones, A. ...	Old land ...	Chiefly gimlet	July	Good ...	Disc ...	3½	Springtyne cultivated in September and August, and again twice before seed-Drilled with combined cultivator-drill	Nabawa	Mid May ...	50	120	Portion dry pickled	Yes	Traces Ball Smut and Takeall.
Don, G. ...	3	Gimlet and Salmon	August	Getting hard	Disc ...	3½	Harrowed in September. Drilled with combined cultivator-drill	Nabawa	16th May ...	60	90	Bluestone	Recleaned	Trace Takeall.
Bear, H. E. ...	Old land	Gimlet, Salmon and Morrel	June	Fair ...	Disc ...	3½	Springtyne cultivated in September. Harrowed in February after rain and scarified before seeding	Gluyas Early	3rd week May	50	90	Dry	Recleaned	Flag Smut and trace Takeall.
O'Loughlan, M.	About 15...	Salmon and Gimlet	July	Good ...	Mouldboard	4	In June, 1928 the land was ploughed indifferently with a disc plough. Rediscd 2in. deep in October and again before seeding. Drilled with combined cultivator-drill	Gluyas Early	Last week May	60	100	Dry	Yes	Trace Flag Smut.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted,	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Thomas, T. ...	1st since abandoned some years previously	Mallee and Teatree	July and August	Good ...	Disc ...	2¼	Rediscd 1¾in. deep prior to seeding	Nabawa	1st week May	37	90	Dry	Yes	
McKinnon, W.	Old land...	Gimlet and Salmon	August	Hard in places	Mould-board	4	Harrowed in September, disced 2in. deep in February after rain. Drilled with combined cultivator-drill and harrowed immediately after	Gluyas Early	25th April ...	45	60	No	No	Traces Ball smut and Flag smut.

WONGAN HILLS AGRICULTURAL SOCIETY.

Eleven competitors in the Wongan Hills Agricultural Society's crop competition submitted crops for inspection. The following table shows the awards made:—

WONGAN HILLS AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
W. N. Armstrong	Wongan Hills	Nabawa ...	30	9	9	13	14	75
G. F. Fowler ...	Wongan Hills	Clubhead ...	31	8	9	13	13	74
Mt. Rupert Co.	Wongan Hills	Gresley ...	30	8	8	13	13	72
A. E. Parker ...	Wongan Hills	Nabawa ...	28	8	9	13	13	71
J. Mincherton ...	Kokardine ...	Nabawa ...	23	9	9	14	14	69
J. H. Ackland ...	Wongan Hills	Nabawa ...	25	9	8	14	12	68
Smith & Nunn...	Wongan Hills	Nabawa ...	27	7	9	13	12	68
P. Martin ...	Wongan Hills	Bena ...	22	9	9	14	13	67
C. H. Park ...	Wongan Hills	Gresley ...	21	8	9	12	14	64
R. R. Ackland...	Wongan Hills	Ford ...	20	9	9	13	12	63
P. W. Gorman...	Rock Hill ...	Ford ...	19	9	9	13	13	63

The winning crop was of the variety Nabawa and had been planted during the first week in May at the rate of 60 lbs. of seed and 100 lbs. of superphosphate per acre. It was very even, well headed and well stooled, free of disease and, except for a few wild oats, comparatively free of weeds. The land had been June fallowed and during September had been redisced four inches deep, the full depth of the original ploughing. Subsequently it was twice springtyne cultivated in the spring and twice again prior to seeding.

Mr. G. F. Fowler's crop of the variety Clubhead, although calculated to yield a bushel per acre more than the winning crop, lost points owing to weeds and uneven growth.

The Mt. Rupert Company's crop of Gresley was calculated to yield 30 bushels per acre, as was the winning crop, but this also lost points awarded under the other sections and was consequently awarded third place.

The rainfall as recorded at Wongan Hills during the year was as follows:-

Wongan Hills.

Jan.	Feb.	Mar.	Apl.	Useful Rains.							Nov.	Dec.	Total for year.
				May.	June.	July.	Aug.	Sept.	Oct.	Total.			
21	178	84	...	339	534	236	145	11	177	1,442	51	...	1,776

Methods of cultivation adopted by the competitors are shown on pages 24-25.

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted,	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						in.								
Armstrong, W. N.	Old land	Salmon and Gimlet	June	Good	Disc.	4	Re-disced 4in. deep in Sept. Springtyne cultivated twice in spring and twice before seeding.	Nabawa	1st week May...	60	100	Dry	No	
Fowler, G. F. ...	Old land	Salmon and Gimlet running to Mallee	Aug.	...	Disc.	4	Redisced 2in. deep in Sept. Springtyne cultivated in January	Clubhead	End of May ...	50	90	Dry	No	Trace, Take-all.
Mt. Rupert Co.	About 6	Salmon and Morrel	July	Good	Disc.	4	Harrowed end of July; springtyne cultivated in Aug.; harrowed in Sept. Springtyned cultivated in March, drilled with combine cultivator-drill. Harrowed after seeding.	Gresley	2nd week May	60	112	Dry	Yes	Traces, Take all, Ball Smut, and Flying Smut
Parker, A. E. ...	Old land	Salmon, Morrel and Gimlet	June and July	Good	Disc.	3	Springtyne cultivated in October; harrowed in Jan. after rain. Springtyne cultivated in February and again in March after rain. Drilled with combined cultivator-drill	Nabawa	3rd week May	60	110 24 per cent.	Dry	Yes	
Mincherton, J. ...	1	Tussocky & Mallee sandplain	End July	Good	Disc.	4	Re-disced 2in. deep in March.	Nabawa	2nd week April	50	120	Dry	Yes	

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Ackland, J. H.	4	Salmon running to York Gum	July	Good	Disc.	3½	Re-disced 2in. deep in Sept., and harrowed in October. Springtyned cultivated in April and drilled with combined cultivator-drill with light harrows attached	Nabawa	1st fortnight, May	55	120	Dry	Yes	Traces, Take-all and Flag Smut, probably in admixture.
Smith and Nunn	10	Salmon, Gimlet and Morrel	July	Fair	Mould-board	2½	Disc cultivated in Sept. Springtyne cultivated in Oct., and again in April	Nabawa	End of April ...	45	90	Dry	Yes	
Martin, P ...	1	Smokebush plain	July	Good	Disc	3	Re-disced 2½ins. deep in March	Bena	Last week, Apl.	45	112	Dry	Yes	
Park, C. H. ...	2	Tussocky scrub plain	June	Good	Disc	4	Re-disced 2½ins. deep in Sept., and drilled with combined cultivator-drill	Gresley	End of May ...	45	90	Dry	Yes	Trace, Flying Smut.
Ackland, R. R.	...	...	...	...	...	...	... ...	Ford	...	...	...	...	...	
Gorman, P. W.	2	Tamma and Smokebush plain	Aug.	Good	Mould-board	4	Harrowed immediately prior to seeding	Ford	2nd week May	60	112	Dry	Yes	

GOOMALLING AGRICULTURAL SOCIETY.

In connection with the crop competition conducted by this Society, three crops only were inspected. Of these, two were those of Mr. H. H. Carter, of Konongorring, and he secured first and second places with the varieties Dollar and Ford respectively.

The following table shows the details of the awards:—

GOOMALLING DISTRICT AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
H. H. Carter ...	Konongorring	Dollar ...	39	7	9	13	13	81
H. H. Carter ...	Konongorring	Ford ...	31	8	9	13	14	75
J. F. Miller ...	Oak Park ...	Nabawa ...	26	7	9	13	13	68

The winning crop was an exceptionally fine one and was calculated to yield 39 bushels per acre. Points were lost for weeds, chiefly wild oats and canary grass. Odd barley plants were noticed and also a trace of the disease "Takeall." The land had been fallowed in July and August, disc cultivated to a depth of two inches during the month of October and again in April. The crop had been planted with a combined cultivator-drill during the second week in May at the rate of 60 lbs. of seed and 90 lbs. of superphosphate per acre.

The rainfalls as recorded at Konongorring and Goomalling throughout the year are shown hereunder:—

—	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Konongoorling	28	170	185	10	324	508	290	139	35	147	1,443	114	4	1,954
Goomsliling	21	73	128	7	224	419	239	130	44	109	1,163	294	3	1,691

The following table summarises the cultural methods of the competitors.

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
Carter, H. H. ...	Old land ...	Salmon and Gimlet	July and August	Getting hard	Mould-board	ins. 4	Disced 2ins. deep in October, and again in April. Drilled with combined cultivator-drill	Dollar	2nd week May	60	90	Dry	Yes	Trace, Take-all.
Carter, H. H. ...	4	Salmon and Gimlet	July and August	Getting hard	Mould-board	4	Springtyned cultivated twice in October. Portion ploughed back 2in. deep with mould-board during Mar. Drilled with combined cultivator-drill.	Ford	1st May ...	60	90	Dry	Yes	Trace, Take-all.
Miller, J. F. ...	Old land ...	Chiefly Salmon Gum	July	Good	Mould-board	3	Harrowed early September; springtyne cultivated end of September and again in March. Drilled with combined cultivator-drill	Nabawa	2nd week May	55	95 24 per cent.	Dry	Yes	Small patches Takeall.

WYALKATCHEM AGRICULTURAL SOCIETY.

Ten crops were inspected in connection with the competition conducted by the above Society, awards being made as follow:—

WYALKATCHEM DISTRICT AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 points.
W. W. Jones ...	Cowcowing ...	Nabawa ...	36	9	9	13	14	71
W. H. Grace ...	North Korrelocking	Merredin ...	24	8	8	14	15	69
A. Allen ...	South Korrelocking	Nabawa ...	24	9	8	14	13	68
C. E. Lehmann	Cowcowing ...	Gluyas Early	24	8	8	13	14	67
S. W. Robinson	Cowcowing ...	Merredin ...	24	9	7	13	13	66
G. Threlfall ...	Korrelocking	Merredin ...	23	8	8	14	13	66
R. Gamble ...	...	Toby's Tusk	24	8	7	13	13	65
C. P. Fenwick ...	Nalkain ...	Nabawa ...	18	9	9	14	12	62
J. E. Tylor ...	Korrelocking	Nabawa ...	18	8	9	14	12	61
J. B. Locyker ...	Cowcowing ...	Gluyas Early	21	8	6	13	12	60

Mr. W. W. Jones secured first place with the variety Nabawa, calculated to yield 26 bushels per acre. The crop was even in growth, free of weeds and comparatively free of disease, but lost points owing to admixture. It had been planted at the end of April with 45 lbs. of seed per acre. Five competitors in this competition secured calculated yields of 24 bushels per acre. Flag Smut was noticed in several crops and, in spite of the seed being treated for the prevention of Ball Smut, this disease also was present in several.

The rainfalls as recorded at the various centres in the district are as follow:—

—	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Cowcowing	13	183	71	...	366	299	125	120	8	51	969	147	9	1,385
Korrelocking	16	166	66	...	363	336	131	105	22	105	1,062	121	...	1,431
Wyalkatchem	9	154	62	6	297	374	155	107	19	82	1,034	110	5	1,380

The methods of cultivation are summarised on the following page.

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Jones, W. W. ...	2	Salmon, Gimlet, and some Morrell	July	Good	Disc.	3½	Springtyne cultivated in September and harrowed after rain. Drilled with combined cultivator-drill	Nabawa	4th week April	45	60	Dry	Yes	Trace, Flag Smut, probably in admixture.
Grace, W. H. ...	About 13	Salmon and Gimlet	Early July	Good	Disc.	4	Springtyne cultivated before seeding	Merredin	1st week May	45	70	Dry	Yes	Traces Flying Smut and Flag Smut
Allan, A. ...	3	Salmon and Gimlet	July	Good	Disc	3	Disced 3in. deep in August; springtyne cultivated in October, and drilled with combined cultivator-drill	Nabawa	1st week May	45	80	Dry	Yes	Traces Ball Smut
Lehmann, C. E.	6	Gimlet and Salmon	July	Good	Mouldboard	4	Springtyned cultivated in Sept. Harrowed 3rd week in Nov., and again in Dec. after rain. Springtyne cultivated in March, and drilled with combined cultivator-drill	Gluyas Early	12th May ...	47	90 24 per cent.	Dry	Yes	Traces Ball Smut, and Takeall.
Robinson, S. W.	...	Salmon and Gimlet running to York Gum	July	Good	Disc	...	Springtyne cultivated in September and again immediately prior to drilling with combined cultivator-drill	Merredin	20th April ...	50	90	Dry	Yes	Flag Smut, traces Ball Smut. and Flying Smut

CULTURAL DETAILS.—*continued*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
Threlfall, G. ...	Old land about 12	Gimlet and some Salmon	1st wk. June	Good	Mould-board	ins. 3½	Scarified 1st week in Sept., harrowed early Dec. Springtyne cultivated 4th week in Feb. Harrowed in March and drilled with combined cultivator-drill	Merredin	13th May ...	45	110	Dry	Yes	Flag Smut, trace Take all.
Gamble, R. ...	4	Salmon and Gimlet	July	Good	Disc	4	Springtyne cultivated in September. Drilled with combined cultivator drill with harrows following	Toby's Tusk	2nd week May	45/50	85	Dry	Yes	Flag Smut, traces Flying Smut and Takeall
Fenwick, C. P.	1	Gimlet, Salmon and Teatree	April, 1929	...	Disc	2½ to 3	Drag harrows behind drill.	Nabawa	1st fortnight, May	45	120	Dry	Yes	
Tyler, J. E. ...	About 11	Mixed, Salmon, Gimlet, Jam, and York Gum	June	Good	Mould-board	4	Springtyne cultivated in Sept. Harrowed twice in spring after rain, disced before seeding, and drilled with combined cultivator-drill	Nabawa	1st week May...	60	125	Dry	Yes	Trace Take-all.
Lockyer, J. B....	5	Salmon and Gimlet; small portion Wodjil	July	Good	Disc	4	Springtyne cultivated in Sept. Harrowed in Dec. after rain, again in Feb. after rain; drilled with combined cultivator-drill	Gluyas Early	5th to 17th May	45	90	Dry	Reclean-ed	Flag Smut, some Ball Smut, traces Flying Smut and Takeall

ZONE 4.

The Agricultural Societies conducting crop competitions in this zone were those of Mt. Marshall and Nungarin. In addition the Karloning and Yilgarn Primary Producers Associations respectively conducted local competitions which, although judged according to the same scale of points did not compete in the zone competitions.

MT. MARSHALL AGRICULTURAL SOCIETY.

Judge—R. P. ROBERTS, B.Sc. (Agric.), Agricultural Adviser.

The winning crop in this district competition was of the variety Nabawa submitted by Mr. M. C. Collins. The crop had stooled well and made good growth, although somewhat uneven in places.

Mustard and wild oats were present, and also plants of other varieties of wheat.

The land, which varied from Salmon and Gimlet to York Gum and scrub, was ploughed 4in. deep during the previous July with a mouldboard plough. It was disc harrowed in February and again in March.

Mr. B. W. G. Hopwood's entry, which was placed second, was calculated to yield 18 bushels per acre. The variety was Gluyas Early planted during the second week in May. The crop was even and free from weeds, but contained a little admixture and was infected with the disease Flag Smut.

The land, which had originally carried York Gum, Mallee and scrub, was ploughed 4½in. deep during June and July, with a disc plough. It was cultivated with a springtyne implement in August and September and planted with a combined cultivator-drill.

The rainfalls recorded at Bencubbin and North Bencubbin for the 1929 growing period are as given below:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
Bencubbin ...	11	84	65	...	302	182	86	100	16	25	711
North Bencubbin...	...	27	52	...	361	210	42	61	22	48	744

The following tables show the points awarded and the cultural methods employed by the competitors:—

MT. MARSHALL AGRICULTURAL SOCIETY.

ZONE 4.

Judge—R. P. ROBERTS, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield, 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Collins, M. C. ...	Bencubbin ...	Nabawa ...	22	8	9	12	12	63
Hopwood, E. W. G.	Bencubbin ...	Gluyas Early	18	9	8	13	13	61
McManus, E. ...	N. Bencubbin	Gluyas Early	14	9	9	11	13	56
McManus, T. and S.	N. Bencubbin	Gluyas Early	12	7	9	13	11	52

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted,	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						in.								
Collins, M. C. ...	Old land...	Salmon, Gimlet, and some York Gum	End July	Good	Mould-board	4	Disc harrowed in February and again in March	Nabawa	End of April	50	60	Dry	Yes	Traces of Takeall.
Hopwood, B. W. G.	4	York Gum, Mallee and Scrub	June-July	Good	Disc	4½	Cultivated with a springtyne implement August-September. Planted with a combined cultivator-drill	Gluyas Early	9th to 12th May	45	112	Dry	Yes	Flag Smut.
McManus, E. ...	4	Wodgil, Mallee and Scrub	Feb., 1927	Dry	Disc	4	Disced to a depth of 3in. in August. Planted with a combined cultivator-drill	Gluyas Early	30th May to 3rd June	25	95	Dry	Yes	Little Bunt.
McManus, T. S., and H. E.	4	Salmon, Gimlet and little Morrel	July	Fairly wet	Disc	3½	Springtyne cultivated in September. Harrowed prior to seeding	Early Gluyas	20th May ...	39	85	Dry	Yes	Traces of Bunt.

NUNGARIN-EASTERN DISTRICTS AGRICULTURAL SOCIETY.

Judge—R. P. ROBERTS, B.Sc. (Agric.), Agricultural Adviser.

Nineteen entries were received in this competition, but ten were withdrawn prior to judging.

The season has again been unfavourable for farmers generally. Heavy rains in May and June gave the crops an excellent start, but an exceptionally dry spring did not enable them to fulfil their early promise. However, it was pleasing to note how well most of the crops had withstood the dry conditions experienced during the later stages of growth. The rainfalls recorded at the various centres in the district are as follows:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
Goomarin ...	14	129	84	...	399	269	70	68	14	72	892
Koroloo	5	172	98	7	291	317	112	97	21	59	897
Kwelkan ...	5	169	80	8	299	240	105	71	15	65	795
Mangowine ...	13	123	86	...	429	181	78	70	11	61	830
Mukinbudin ...	7	43	88	...	261	176	63	54	24	82	660

Mr. R. Fitzpatrick's winning plot was a crop of Gluyas Early calculated to yield 25 bushels per acre. The soil was a mixture of Salmon and Morrel country with a little Gimlet and Jam.

The land was ploughed to a depth of four inches at the end of June, 1928. It received a cultivation with a springtyne implement in September and was rolled with a T-bar roller and harrowed in October. It was again harrowed after rain in February. Seeding took place on the 10th May with 43 lbs. of graded seed and 78 lbs. of superphosphate per acre.

This was a dense, well grown crop. In common with all the other crops of Gluyas Early submitted for inspection in this district, there was a certain amount of infection by Flag Smut.

Mr. G. T. Young, of Goomarin, gained second place also with a crop of Gluyas Early sown on the 50 acres of fallow which won the Nungarin Agricultural Society's fallow competition earlier in the year. It was sown at the rate of 45 lbs. of seed and 95 lbs. of superphosphate per acre.

The land, which was Salmon and Gimlet country, was ploughed to a depth of 4in. during the previous June with a mouldboard plough. It was disced (Sundercut) in August, scarified (with harrows behind) in September, and later in the same month it was springtyne cultivated, with harrows behind. It received a further harrowing after the mid-February rains, whilst in March it was harrowed and cultivated with the springtyne cultivator. It received a final working with the springtyne immediately before seeding.

This was a fairly even crop except in isolated patches where water logging had occurred. It was very free from admixture, but contained a fair amount of Flag Smut infection and also a few wild oats.

The following table shows the points awarded and the cultural methods employed by the competitors:—

NUNGARIN–EASTERN DISTRICTS AGRICULTURAL SOCIETY.

ZONE 4.

Judge: R. P. Roberts, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Fitzpatrick, R. C.	Nungarin ...	Gluyas Early	25	9	8	14	13	69
Young, G. T. ...	Goomarin ...	Gluyas Early	22	8	8	14	13	65
Reynolds, A. G.	Mukinbudin	Gluyas Early	20	8	8	14	14	64
Williams, F. A.	Talgomine ...	Nabawa ...	19	8	9	14	13	63
Johnson, J. H....	Talgomine ...	Nabawa ...	19	9	9	14	12	63
Creagh, Bros. ...	Kwelkan ...	Nabawa ...	18	9	9	14	11	61
Dumsday, L. ...	Goomarin ...	Nabawa ...	19	7	9	14	11	60
Watson, Bros. ...	Kwelkan ...	Gluyas Early	18	8	6	13	12	57
Dawe, F. J. ...	Nungarin ...	Canberra ...	19	7	7	11	13	57

CULTURAL DETAILS

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Fitzpatrick, R. C.	4	Salmon Gum, Morrell, and a little Gimlet and Jam	End June	Good	Sundercut	4	Springtyne cultivated in September. Rolled with a T-bar roller and harrowed in October. Harrowed after rain in February. Planted with a combined cultivator drill	Gluyas Early	10th May ..	43	78	Dry	Yes	Flag Smut.
Young, G. T. ...	5	Salmon Gum and Gimlet	Early June	Good	Mouldboard	4	Sundercut in August. Scarified (with harrows behind) in September Springtyne cultivated (with harrows behind) in September. Harrowed in February. Harrowed and springtyne culitvated in March. Springtyne cultivated immediately prior to seeding	Gluyas Early	17th May ...	45	95	Dry	Yes	Flag Smut.
Reynolds, A. G.	3	Salmon Gum and Jam	Early June	Good	Sundercut	3/4	Disc. ploughed 3in. deep first week in August. Cultivated with a springtyne implement in September. Harrowed first week in October. Planted with a combined cultivator-drill with harrows attached	Gluyas Early	4th and 6th May	35	90	Dry	Yes	Flag Smut, and a trace of Ball Smut.
Williams, F. A.	About 12	Salmon Gum and Gimlet	Late June	Good	Scarifier and harrows	3	Scarified in August. Scarified and harrowed after rain at the end of March. Planted with a combined cultivator-drill	Nabawa	2nd week May	45	70	Dry	Yes	Traces of Loose Smut.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
Johnston, J. H.	6	Salmon Gum and Gimlet	June	Good	Disc	ins. 4	Cultivated with a springtyne cultivator at the end of August, again in October and again in February	Nabawa	3rd week April	45	80	Dry	Yes	Trace of Loose Smut
Creagh, Bros. ...	Old land ...	Salmon Gum, Gimlet, and Mallee	July	Fairly Good	Disc	3/4	Springtyne cultivated in September and again in February. Harrowed in March. Planted with a combined cultivator-drill, followed by harrows	Nabawa	2nd week May	45	90	Dry	Yes	Little loose Smut.
Dumsday, L. ...	3	Gimlet, Salmon Gum, and a little Mallee	Feb., 1928	Good	Disc	4	Reploughed first week in September Springtyne cultivated in October. Harrowed after rains in February and March. Planted with a combined cultivator-drill	Nabawa	Last week in April	45	90	Dry	Yes	Traces of Loose and Ball Smut.
Watson Bros. ...	Old land ...	Salmon Gum, Morrell, and Tea-Tree	End June	Good	Sundercut	3	Harrowed in October and again in March. Planted with a combined cultivator-drill	Gluyas Early	3rd week April	45	80	Dry	No	Flag Smut.
Dawe, F. J. ...	Old land ...	Salmon Gum, Gimlet, and Mallee	July	Fairly Good	Disc	3/4	Disced (Sundercut) in September and again prior to seeding	Canberra	1st week May	45/50	90	Dry	Yes	Flag Smut.

KARLONING PRIMARY PRODUCERS' ASSOCIATION.

Judge—R. P. Roberts, B.Sc. (Agric.), Agricultural Adviser.

The Karloning Primary Producers' Association is to be congratulated upon its enterprise in promoting a 50-acre crop competition for a cup donated by Mr. John Driver, a farmer resident of the district. It is a progressive step for any district to inaugurate competitions of this nature, but the farmers of Karloning are particularly to be commended for their enthusiasm in the face of difficulties naturally attendant upon an unfavourable season in a new district.

All the crops submitted for inspection were either on new land or first year stubble, and received no cultivation other than that given when being planted with a combined cultivator-drill. Thus, as was only to be expected, there was a noticeable uniformity about the entries and only a relatively small margin separated the best from the poorest crops.

It is hoped that next year a large proportion of the competitors will have their crops on falow. The competition will then serve the purpose for which these competitions were primarily designed, *i.e.*, to emphasise the value of sound farming methods.

Mr. H. Johnson was awarded first place with a crop of Gluyas Early calculated to yield 15 bushels per acre. The land was Salmon Gum, Gimlet and scrub country which had carried its first crop the previous year. Seeding was carried out with a combined cultivator-drill during the second week in May on the previous year's stubble.

Considering the unfavourable season the crop had made good growth, but was somewhat patchy on account of unevenness in the seed bed due to clearing operations. This entry contained a fair amount of admixture of another variety and also some barley. It was almost entirely free from weeds and disease.

In general it was typical of the majority of the entries.

The rainfall recorded at Karloning to October, 1929, is as follows:—

Jan.	Feb.	Mar.	April.	Growing Period.						May to Oct.
				May.	June.	July.	Aug.	Sept.	Oct.	
...	73	117	...	414	191	47	74	38	135	899

The following table shows the points allotted to the competitors:—

KARLONING PRIMARY PRODUCERS' ASSOCIATION.

Zone 4.

Judge: R. P. Roberts, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Johnson, H. T.	Karloning ...	Gluyas Early	15	9	9	13	12	58
Tallis, W. ...	Karloning ...	Nabawa ...	13	9	9	13	13	57
Hewitt, E. ...	Karloning ...	Gluyas Early	15	8	8	13	12	56
O'Neil, H. ...	Karloning ...	Nabawa ...	14	9	8	13	12	56
Driver, F. ...	Karloning ...	Gluyas Early	13	9	9	13	12	56
Seaby, H. ...	Karloning ...	Nabawa ...	14	9	8	12	13	56
Bell, O.... ...	Karloning ...	Gluyas Early	11	9	9	14	11	54
Molyneaux Bros.	Karloning ...	Gluyas Early	12	9	8	13	12	54
O'Neil, J. ...	Karloning ...	Gluyas Early	11	9	8	13	12	53
Broomhall, V. ...	Karloning ...	Gluyas Early	12	8	8	12	11	51
Hewitt, B. ...	Karloning ...	Nabawa ...	10	8	9	13	11	51
Watkins, Mrs. O. J.	Karloning ...	Gluyas Early	14	8	7	10	11	50
Howarth & Mitchellmore	Karloning ...	Gluyas Early	11	7	8	12	12	50

YILGARN PRIMARY PRODUCERS' ASSOCIATION.

Judge—G. L. THROSSELL, Dip. Agric., Agricultural Adviser.

The Yilgarn Primary Producers' Association, as was the case last year, promoted two crop competitions, one for crops grown on fallow and the other on non-fallow. For the former six entries were received, and for the latter eight.

The rainfalls recorded at official stations near the competitors were as follow:—

Station.	Jan.	Feb.	Mar.	Apl.	Growing Period.						May to Oct.	Jan. to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.		
Ccrinthian...	15	86	63	...	336	178	75	61	16	93	759	923
Moorine Rock	40	150	68	1	439	203	71	64	11	56	844	1,103

This area, like many others this season, had splendid early rains, which gave the crops a good start, but when the late rains failed to materialise the yields suffered in consequence. This competition shows, however, that when sound methods are adopted, reasonably good yields can be obtained even in a season when the rainfall is not favourable. The yields obtained from the crops on the unfallowed land in the Moorine Rock district were considerably better than was expected in view of the adverse growing conditions.

50 *Acre Competition on Fallow.*

The competition for 50 acres of wheat of one variety on fallow resulted as follows:—

YILGARN PRIMARY PRODUCERS' ASSOCIATION.

FALLOW.

Judge: G. L. Throssell, Dip. Agric., Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Dowdall, W. ...	Moorine Rock	Nabawa ...	19	8	9	14	14	64
Pickworth, W. ...	Moorine Rock	Nabawa ...	18	8	9	14	14	63
Davies, R. E. R.	Turkey Hill	Nabawa ...	18	9	9	14	13	63
Swinstead, H. H.	Moorine Rock	Gluyas Early	17	8	8	14	14	61
Lecky, J. V. ...	Corinthian ...	Nabawa ...	16	9	9	13	13	60
Chapman, F. T.	Moorine Rock	Gluyas Early	13	8	9	14	12	56

First place was gained by Mr. H. E. Dowdall of Moorine Rock with a crop of Nabawa, which was awarded 64 points and which was calculated to yield 19 bushels per acre, equivalent to 2¼ bushels per acre per inch of rain in the growing period. The land had been ploughed in June, springtyne cultivated in September, harrowed in January and March and planted with a combined cultivator drill. This crop was fairly true to type, but points were lost for the presence of weeds (Milk Thistles) which are fairly evident also on the fallowed land in this area.

Messrs. W. Pickworth and R. E. R. Davies tied for second with 63 points, the variety in each case being Nabawa. Mr. Davies' yield of 18 bushels was a very creditable one in view of the fact that his crop received 85 points less rain.

It is apparent, after an examination of the cultural methods shown in the following table, that the competitors are applying the knowledge gained from the results obtained at the Yilgarn Experiment Farm. The importance of early fallow, maintaining the mulch during the summer, light seeding, time of planting and varieties cannot be over-stressed in this area. Experiments indicate that the rates of superphosphate could be increased with advantage.

CULTURAL DETAILS—FALLOW SECTION.

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
					ins.								
Dowdall, H. E.	2	Morrell, Salmon and Gimlet	June	Disc	4	Springtyned September. Harrowed January and March	Nabawa	3rd week April	25	90	Dry	Yes	
Pickworth, W....	3	Morrell, Salmon and Gimlet	July	Scarified	3	Harrowed August. Scarified September. Harrowed January and March	Nabawa	End April ...	25	90	Dry	Yes	
Davies, R. E. R.	4	Salmon, Gimlet and Jam	June	Disc	4	Springtyne cultivated September. Harrowed March	Nabawa	3rd week April	30	80	Dry	Yes	
Swinstead, H....	2	Gimlet and Mallee	June	Disc	3	Springtyned September. Harrowed in March	Gluyas Early	Early May ...	26	60	Dry	Yes	Flag Smut.
Lecky, J. V. ...	3	Salmon, Gimlet	June	Disc	3	Springtyned September	Nabawa	3rd week April	20	60	Dry	Yes	
Chapman, F. T.	3	Salmon, Gimlet and Morrell	July	Disc	4	Springtyned September. Scarified February. Harrowed March	Gluyas Early	Mid April ...	38	70	Dry	Yes	

Combined cultivator-drills were used by all competitors when planting.

50-acre Competition on Non-Fallow.

This is the last competition that the Association intends to conduct on unfallowed land, and it was continued this year for the benefit of the farmers who were fallowing for the first time.

The awards were as follow:—

YILGARN PRIMARY PRODUCERS' ASSOCIATION.

NON FALLOW.

Judge: G. L. Throssell, Dip. Agric., Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Green & McKettrick	Moorine Rock	Gluyas Early	17	9	8	13	14	61
Pickworth, W. ...	Moorine Rock	Gluyas Early	15	9	8	14	13	59
Luxton, R. J. ...	Moorine Rock	Gluyas Early	14	9	9	13	13	58
Whan, T. J. ...	Moorine Rock	Gluyas Early	13	9	8	13	13	56
Liddell & Carstairs	Moorine Rock	Gluyas Early	13	9	9	12	12	55
Trundle, W. ...	Moorine Rock	Nabawa ...	12	9	9	13	12	55
Becker & Hough	Turkey Hill	Gluyas Early	12	9	8	14	12	55
F. & J. Davies	Corinthian ...	Gluyas Early	12	9	9	12	12	54

Messrs. Green and McKettrick's entry of the variety Gluyas Early was outstanding. It was calculated to yield 17 bushels per acre and was awarded 61 points. Its chief defect was the presence of Flag Smut, which was found in a number of crops in the district. The land originally carried salmon gum, gimlet and teatree timber and had been cropped twice previously. It received no working prior to seeding, the stubble being burnt and the crop planted with the combined cultivator-drill.

Mr. Pickworth's entry, also of the variety Gluyas Early, was placed second with 59 points. This land was being cropped for the second time and received a cultivation in March.

The following table summarises the cultural methods:—

CULTURAL DETAILS—NON FALLOW.

Competitor.	Timber.	No. of years cropped.	Cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Diseases.
Green & McKettrick	Salmon, Gimlet, Teatree	3	None ...	Gluyas Early	Mid. April	30	65	Flag Smut
Pickworth, W....	Morrell, Salmon, Gimlet	2	Cultivated in March	Gluyas Early	Mid May	25	60	Flag Smut
Luxton, R. J. ...	Gimlet, Mallee	1	None ...	Gluyas Early	End April	25	60	
Whan, T. J. ...	Gimlet, Teatree	1	None ...	Gluyas Early	Early May	25	60	Flag Smut
Liddell & Carstairs	Mallee, Gimlet	2	None ...	Gluyas Early	3rd wk. April	34	60	
Trundle, W. ...	Mallee, Morrell	2	None ...	Nabawa	End April	30	65	
Davies, F. & J.	Gimlet ...	1	Cultivated in March	Gluyas Early	Early May	35	80	
Becker & Hough	Salmon, Gimlet, Boree	3	Harrowed February, Cultivated April	Gluyas Early	Early May	30	45	Flag Smut

All competitors graded and dry pickled, and used combined cultivator drills.

ZONE 5.

The competitors eligible to compete for the Zone Championship awards in this zone were those entries forwarded to the Royal Agricultural Society from the Doodlakine-Baandee and Merredin District Agricultural Societies, and also from one competitor direct.

The Bruce Rock Agricultural Society also conducted a competition, but unfortunately these entries were not received by the Secretary of the Royal Agricultural Society before the date fixed for the closing of the Zone Com petition.

DOODLAKINE-BAANDEE AGRICULTURAL SOCIETY.

Judge—G. L. Throssell, Dip. Agric., Agricultural Adviser.

For this competition five entries were received, three from Doodlakine and two from Baandee. The rainfall at these centres was as follows:—

...—	Jan.	Feb.	Mar.	Apl.	Growing Period.						May to Oct.	Jan. to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.		
Doodlakine	...	162	120	3	203	322	183	130	8	28	874	1,159
North Baandee	64	184	?	5	406	342	153	91	7	50	1,049	?

The season started well, but the lack of rain at the critical periods minimised the chances of a record harvest. North Baandee registered 157 points more than Doodlakine during the growing period.

The awards are set out in the following table:—

DOODLAKINE-BAANDEE AGRICULTURAL SOCIETY.

ZONE 5.

Judge: G. L. Throssell, Dip. Agric., Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Prowse Bros. ...	Doodlakine...	Nabawa ...	22	9	9	14	13	67
Prowse, E. W....	Doodlakine...	Gluyas Early	20	8	8	14	13	63
Prowse, A. E. C.	Doodlakine...	Gluyas Early	19	8	8	14	13	62
Spillman, J. W.	Baandee ...	Merredin ...	17	7	7	13	12	56
Spillman, D. J.	Baandee ...	Merredin ...	15	8	8	13	12	56

The competition was won by Messrs. Prowse Bros., whose crop of Nabawa, part of a paddock of 280 acres of the same variety, was awarded 67 points with a calculated yield of 22 bushels, equivalent to 2½ bushels per inch of rain during the growing period. The land was mouldboard ploughed in June and springtyne cultivated in September, after which it was rolled to break the clods. It was tandem disced and harrowed in February. The crop was well grown and, had the season finished more favourably, would have yielded considerably more than 22 bushels.

Mr. E. W. Prowse was placed second, scoring 63 points with a crop of Gluyas Early. This entry lost points for traces of Flag Smut and Bunt.

The cultural details are as follow:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
Prowse Bros. ...	Since 1912	Salmon, Gimlet, Teatree	June	Mouldboard	ins. 4	Springtyned rolled Sept. and Tandem disced and harrowed Feb.	Nabawa	End April ...	45	100	Yes	Yes	Takeall
Prowse, E. W. ...	9	Salmon Gimlet	July	Disc.	3½	Springtyned Oct. Portion rolled Feb. Springtyned Mar.	Gluyas Early	End May ...	45	90	Yes	Yes	Flag Smut, Bunt, Takeall
Prowse, A. E. C.	?	Salmon and Gimlet	June	Mouldboard	4	Springtyned Aug. and Sept., and prior to seeding	Gluyas Early	Mid May ...	45	100	Yes	Yes	Flag Smut, Takeall,
Spillman, J. W.	7	Salmon, Gimlet and Morrel	June-July	Shuldercift	4	Springtyned Sept. and Oct., and prior to seeding	Merredin	Early May ...	55	90	Yes	Yes	Takeall, Flag Smut.
Spillman, D. J.	Since 1922	Salmon, Gimlet	July	Disc	4	Springtyned prior to seeding	Merredin	Early May ...	45	90	Yes	Yes	Flag Smut.

MERREDIN DISTRICT AGRICULTURAL SOCIETY.

Judge—G. L. THROSSELL, Dip. Agric., Agricultural Adviser.

Of the twenty-four entries received, fourteen crops were submitted for judging in this competition. It is to be regretted that such a large number withdraw each year from this Society's Crop Competition.

The rainfalls recorded at various places throughout the district were as follow:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.						May to Oct.	Jan. to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.		
Merredin	50	162	77	...	357	309	119	94	13	35	927	1,216
Exp. Farm South Walgoolan	10	222	78	...	283	236	106	82	9	35	751	1,061
Walgoolan...	...	175	75	...	380	280	113	64	13	93	943	1,193
Talgomine	14	129	84	...	399	269	70	68	14	72	892	1,119
Totadgin ...	46	118	81	...	411	335	195	129	20	39	1,129	1,374
Nukarni ...	10	173	85	2	322	270	103	77	15	64	861	1,131

The points awarded are shown in the following table:—

MERREDIN AGRICULTURAL SOCIETY.

Judge—G. L. Throssell.

Competitor.	District.	Variety.	Points.					
			Yield.	Weeds	Disease.	Admixture.	Evenness.	Total.
W. Cook	South Walgoolan	Nabawa ...	26	9	9	13	14	71
H. W. Teasdale ...	Totadgin ...	Nabawa ...	25	9	9	14	13	70
C. Rowan	Merredin ...	Nabawa ...	24	9	9	14	13	69
F. O. Teasdale ...	Korbel	Merredin ...	24	9	7	14	14	68
J. B. Lambert ...	South Burracoppin	Merredin ...	24	9	7	13	14	67
W. S. Crouch ...	South Burracoppin	Nabawa ...	22	9	9	13	14	67
T. G. and J. Maughan	Nukarni	Merredin ...	23	8	7	14	14	66
R. M. King ...	South Walgoolan	Gluyas Early...	21	9	8	14	14	66
T. H Smallacombe	Nangeenan ...	Canberra ...	22	8	7	14	13	64
Barnett Bros. ...	North Walgoolan	Gluyas Early ...	21	9	8	13	13	64
J. D. Maughan ...	South Walgoolan	Nabawa ...	20	8	9	13	13	63
J. E. Clothier ...	Totadgin ...	Nabawa ...	19	8	8	14	13	62
L. Dumsday ...	Talgomine ...	Nabawa ...	18	9	8	13	13	61
J. S. Priestly ...	Merredin ...	Gluyas Early ...	15	9	8	14	12	58

The winner was Mr. W. Cook of South Burracoppin, who entered the Zone Competition for the first time and who was placed third in the fallow competition. His crop of Nabawa was awarded 71 points and was calculated to yield 26 bushels per acre.

Mr. H. W. Teasdale's crop of Nabawa gained second place with 70 points with a yield of 25 bushels per acre.

As the table of awards will show, Nabawa still maintains its popularity in this district. Several good crops of Merredin were shown, as well as Gluyas Early and Canberra. While these three varieties are good early wheats, they are all very susceptible to the disease Flag Smut. Nabawa, on the other hand, is very resistant. No Bunt was found in any competition crops, although traces of Takeall were present in several.

The methods of cultivation of the various competitors are as follows:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
Cook, W. ...	3	Salmon and Gimlet	Early July	Disc	in. 3	Scarified in August and September. Springtyne cultivated in January and February	Nabawa	Mid-May ...	43	80	Yes	Yes	Takeall.
Teasdale, H. W.	5	Gimlet ...	July	Disc	in. 3½	Scarified in September. Springtyne cultivated in February	Nabawa	1st week May	45	90	Yes	Yes	Takeall.
Rowan, C. ...	3	Salmon and Gimlet	June and July	Mouldboard	in. 3	Springtyne cultivated in August and again in October. Springtyne cultivated and harrowed prior to seeding	Nabawa	3rd week May	50	112	...	Yes	Takeall.
Teasdale, F. O....	...	Gimlet and Morrell	June and July	Mouldboard	in. 3½	Springtyne cultivated in September and October and again in February	Merredin	1st week May	45	93	Yes	Yes	Flagsmut and Takeall.
Lambert, J. B.	4	Salmon and Gimlet	July	Disc	in. 3–4	Scarified twice in April	Merredin	1st week May	45	90	Yes	Yes	Flag Smut and Takeall.
Crouch, W. S. ...	...	Salmon and Gimlet	July and August	Mouldboard	in. 6	Springtyne cultivated in February	Nabawa	End March ...	50	90	Yes	Yes	Takeall.
Maughan, T. G., and J.	...	Gimlet and Morrell	June and August	Mouldboard	in. 3–4	Springtyne cultivated in August. Harrowed in September. Springtyne cultivated and harrowed in February and March	Merredin	End May ...	50	90	Yes	Yes	Flag Smut.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
					in.								
King, R. M. ...	4	Gimlet ...	June	Disc	4	Disced in August. Springtyned cultivated in October and again in March	Gluyas Early	Early May ...	45	90	Yes	Yes	Flag Smut.
Smallacombe, T. H.	...	Gimlet, Salmon, Jam and Mallee	July	Disc	4	Springtyne cultivated in September and October and again in April	Canberra	Mid-May ...	60	90	Yes	Yes	Flag Smut and Takeall.
Barnett Bros. ...	3	Salmon and Gimlet	July	Disc	4	Springtyne cultivated in August and September. Portion skim-ploughed in October and balance springtyne cultivated. Harrowed in February	Gluyas Early	Early May ...	43	87	Yes	Yes	Flag Smut.
Maughan, J. D.	3	Mallee, Teatree and Gimlet	Early June	Disc	3–4	Re-disced in July and end of August. Springtyne cultivated in January	Nabawa	Early May ...	45	90	Yes	Yes	Flag Smut.
Clothier, J. E. ...	10	Salmon and Gimlet	August	Disc	4	Springtyne cultivated in September, Harrowed in February	Nabawa	Early May ...	45	90	Yes	Yes	Takeall.
Dumsday, L. ...	2	Salmon, Gimlet and Jam	March	Rigid-tyne scarifier	3	Scarified in September. Springtyne cultivated in February and harrowed in March	Nabawa	End April ...	45	90	Yes	Yes	Takeall.

CULTURAL DETAILS.—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
Priestly, J. S. ...	6	Morrel, Gimlet and Wodjil	August	Disc	in. ...	Springtyne, cultivated in September. Harrowed in February and springtyne cultivated prior to seeding	Gluyas Early	1st week May...	35	90	Yes	Yes	Flag Smut and Takeall.

ROYAL AGRICULTURAL SOCIETY.

Judge—G. L. Throssell, Dip. Agric., Agricultural Adviser.

As no competition was conducted in the Meckering district, the entry of Mr. M. H. Reynolds was received direct by the Royal Agricultural Society.

The rainfall for Meckering was as follows:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	May to Oct.	Jan. to Oct.
Meckering ...	2	63	110	3	250	429	250	141	36	90	1,196	1,374

The points awarded are as follow:—

Competitor.	Variety.	Yield. 50 points.	Freedom from— Weeds. 10 points.	Disease. 10 points.	Admixture. 15 points.	Evenness of growth 15 points.	Total. 100
M. H. Reynolds, Meckering ...	Gresley ...	20	9	9	14	13	65

This was a very well grown crop, being very free of weeds, disease and admixture, but rather uneven.

The cultural methods were as under:—

CULTURAL DETAILS.

Competitor.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.
Reynolds, M. H. ...	York Gum, Jam and Morrel	August ...	Mouldboard	in. 5	Springtyne cultivated in September

Competitor.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.
Reynolds, M. H. ...	Gresley ...	Mid-May ...	70	90	Dry pickled	Yes

BRUCE ROCK AGRICULTURAL SOCIETY.

Judge—G. L. Throssell, Dip. Agric., Agricultural Adviser.

The Bruce Rock Agricultural Society conducted two crop competitions, one an open competition and the other confined to those crops grown on the competition fallow.

The rainfalls for various stations in the locality were as hereunder:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	May to Oct.	Jan. to Oct.
Bruce Rock	...	55	114	7	254	312	216	120	21	41	964	1,140
Babakin ...	...	25	140	...	271	355	180	82	26	57	971	1,136
Central Kumminin	11	44	120	...	236	335	184	110	28	31	923	1,098

Had the months of September and October received the average rainfall it is expected that a record harvest would have resulted for this district. Although an unfavourable season was experienced, particularly good yields have been obtained.

50 *acre Crop Competition.*

Messrs. C. Smith and Sons, of Yarding, succeeded in winning this competition from seventeen other competitors, all of whom submitted crops which yielded better than sixteen bushels per acre. The winning crop was of the variety Gluclub and was calculated to yield 29 bushels per acre. In preparation for this crop the land was June fallowed, disc cultivated in August and springtyne cultivated in September. The crop was planted early in May and sown at the rate of 45 lbs. of seed and 93 lbs. of superphosphate per acre. The crop was very well grown, but lost points for unevenness in the vicinity of a lake. As was the case in all the crops of the variety, Gluclub, in the competition, admixture was noticeable. Points were lost for traces of Flag Smut and Takeall.

The points awarded are as follow:—

BRUCE ROCK AGRICULTURAL SOCIETY.

Judge: G. L. Throssell.

Competitor.	District.	Variety.	Points.					
			Yield.	Weeds.	Disease.	Admixture.	Evenness.	Total
			50	10	10	15	15	100
C. Smith & Sons ...	Yarding	Gluclub ...	29	9	9	13	13	73
Buller & Black ...	Babakin	Gallipoli ...	27	9	8	14	14	72
R. Mann	Sth. Shackleton	Gluclub ...	27	9	8	13	14	71
C. & A. H. Smith ...	Yalbarin ...	Gluclub ...	28	9	8	13	13	71
P. Strange	Eujinyn ...	Gluclub ...	27	9	8	13	13	70
W. Arnold	Yalbarin ...	Gluclub ...	27	8	7	13	14	69
H. D. Jacob ...	Erikin	Gluclub ...	26	9	8	13	13	69
C. E. & N. S. Schilling	Bungulluping ...	Gluclub ...	24	9	8	13	13	67
H. E. Francis ...	Babakin	Waratah ...	22	8	9	14	13	66
G. E. Robins & Co.	Babakin	Gluclub ...	22	9	8	13	13	65
E. G. Ellis	Central Kuminin	Gluclub ...	22	8	8	13	12	63
B. Altham	Yalbarin ...	Gluclub ...	21	8	8	13	13	63
J. W. Bristow ...	Ardath	Merredin ...	21	8	7	13	14	63
W. D. Johnson ...	Bruce Rock ...	Gluclub ...	21	9	7	13	13	63
Allen Bros. ...	Central Kuminin	Gluyas Early	20	8	7	14	13	62
D. H. Faulkiner ...	Babakin	Nabawa ...	18	9	9	13	12	61
B. Altham	Yalbarin	Nabawa ...	17	7	8	13	12	57
A. H. Norris ...	Belka	Nabawa ...	16	7	8	13	12	56

This is a *local* competition and not entered with the Royal.

Messrs. Buller and Black, of Babakin, came second with a crop of the variety Gallipoli. The crop also won the combined Crop and Fallow Competition.

Of the eighteen entries no less than eleven were of the variety Gluclub, which is a very popular variety in this district. This variety is a good yielder and stands well. It has, however, defects which prevent its being recommended as a standard variety. In addition to shedding its grain readily, Gluclub is not resistant to diseases and its milling qualities are below standard. The last-named defect is most serious from the miller's point of view. It is obvious that if varieties of low milling qualities are grown to a large extent, our present standard of wheat exported will be lowered and the price affected accordingly.

The cultural methods of the competitors are shown in the following table:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
					ins.								
Smith, C. & Sons	3	Salmon, Gimlet, and Teatree	June	Disc	3	Disced in August. Springtyne cultivated in September	Gluclub	Early May ...	45	93	Yes	Yes	Takeall and Flag Smut.
Buller & Black	...	Salmon, Gimlet, and Morrell	June	Disc	3	Springtyne cultivated in August, and half in Sept. Balance scarified in Sept. Harrowed in March and scarified prior to seeding	Gallipoli	Mid May ...	50	95	Yes	Yes	Flag Smut.
Mann, R. ...	6	Salmon and Gimlet	Late July and Aug.	Mouldboard	3–4	Springtyne cultivated in September, scarified and harrowed in early October. Scarified in April	Gluclub	3rd week April	60	112	Yes	Yes	Flag Smut and Takeall
Smith, C. and A. H.	...	Salmon, Gimlet, and Morrell	June	Mouldboard	3	Disced in August. and October	Gluclub	Early May ...	45	90	Yes	Yes	Flag Smut and Takeall
Strange, P. ...	8	Morrell, Yorrell, and Gimlet	June	Disc	3½	Springtyne cultivated in September, and again in April	Gluclub	Early May ...	48	100	Yes	Yes	Flag Smut.
Arnold, W. ...	...	Salmon and Gimlet	July	Rigid tyne scarifier	3	Disced at end of August and springtyne cultivated in March	Gluclub	Early May ...	45	90	Yes	Yes	Flag Smut and Takeall.
Jacob, H. D. ...	...	Salmon and Gimlet	July	Disc	3	Scarified in September	Gluclub	Early May ...	50	90	Yes	Yes	Flag Smut and Takeall.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
Schilling, C. E. & N. S.	4	Salmon and Gimlet	Early June	Disc	ins. 3-4	Harrowed in June. Scarified early July. Springtyne cultivated end of July and September. Scarified early May	Gluclub	Early May ...	60	75	Yes	Yes	Flag Smut and Takeall.
Francis, H. E.	..	Salmon, Gimlet and Jam	June	Disc	4	Scarified in September. Harrowed in September, and again prior to seeding	Waratah	3rd week April	50	90	Yes	Yes	Bunt and Takeall.
Robins, G. E. & Co.	7	Salmon Gimlet and Morrell	End Jan.	Disc	4	Scarified mid. July, harrowed in August Springtyne cultivated in September. Harrowed in October	Gluclub	Early May ...	45	112	Yes	Yes	*Bunt and Takeall.
Ellis, E. G. ...	...	Salmon and Gimlet	Early June	Disc	3	Harrowed in July. Disced end of July. Springtyne cultivated early August and again in March and May	Gluclub	Mid May ...	50	90	Yes	Yes	Flag Smut.
Altham, B. ...	4	Salmon and Gimlet	June	Mouldboard	3½	Disced in September. Springtyne cultivated in October and twice in April	Gluclub	End April ...	45	90	Yes	Yes	Bunt and Takeall.
Bristow, J. W.	...	Salmon, Gimlet and Morrell	June	Rigid tyne scarifier	3	Scarified in July-August. Springtyne cultivated in September and March	Merredin	3rd week May	60	90	Yes	Yes	Flag Smut Takeall and Bunt.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Pickled.	Graded.	Disease.
Johnson, W. D.	...	Salmon and Gimlet	July and August	Mould-board	ins. 4	Springtyne cultivated in August and September	Gluclub	End April ...	50	90	Yes	Yes	Flag Smut and Bunt.
Allen, Bros. ...	5	Salmon and Gimlet	June	Rigid tyne scarifier	3	Scarified in September. Springtyne cultivated in Mar.	Gluyas Early	End May ...	50	90	Yes	Yes	Flag Smut and Bunt.
Faulkner, D. ...	7	Salmon, Gimlet and Jam	July	Mould-board	3-4	Disced in August. Springtyne cultivated in April	Nabawa	End April ...	60	80	Yes	Recleaned	Takeall.
Altham, B. ...	6	Salmon and Gimlet	July	Mould-board	3½	Disced in September. Springtyne cultivated in October, and twice in April.	Nabawa	End April ...	45	90	Yes	Yes	Takeall.
Norris, H. H. ...	...	Salmon ...	July	Disc	3½-4	Disced in September. Harrowed twice in October	Nabawa	Mid May ...	55	95	Yes	Yes	Bunt and Takeall.

50 acre Fallow and Crop Competition.

Messrs. Buller and Black, of Babakin, won this competition with a crop of Gallipoli which was awarded a total of 72 points, with a calculated yield of 27 bushels per acre, equivalent to 2.8 bushels per inch of rain during the growing period. This variety is short strawed, being on an average less than three feet high. It was very free of weeds and admixture, and a little Flag Smut was present.

This entry also wins the combined Crop and Fallow Competition, defeating the winning fallow of C. E. & N. S. Schilling by two points.

The points awarded are as follow:—

BRUCE ROCK AGRICULTURAL SOCIETY.

FALLOW AND CROP Competition.

Judge—G. L. TROSSELL.

Competitor.	District.	Variety.	Points.						Total fallow. 100	Aggregate. 200
			Yield.	Weeds.	Disease.	Admixture.	Evenness.	Total. 100		
Buller & Black ...	Babakin ...	Gallipoli ...	27	9	8	14	14	72	88	160
C. E. and N. S. Schilling	Bungulluping ...	Merredin ...	23	9	8	13	14	68	91	159
R. Mann	South Shackleton	Gluclub ...	27	9	8	13	14	71	87	158
E. G. Ellis	Central Kumininup	Gluclub ...	22	8	8	13	12	63	91	154
W. D. Johnson ...	Bruce Rock ...	Gluclub ...	21	9	7	13	13	63	85	148
G. E. Robins & Co.	Babakin	Gluclub ...	22	9	8	13	13	65	83	148
Allen Bros.	Central Kumininup	Nabawa ...	17	7	9	14	12	59	86	145

Mr. R. Mann, of South Shackleton, was awarded 71 points for a crop of Gluclub which should also yield 27 bushels per acre.

The following table shows the cultural methods of the competitors:—

CULTURAL DETAILS

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
					ins.								
Buller and Black	...	Salmon, Gimlet and Morrel	June	Disc	3	Springtyne cultivated in August, half springtyne cultivated and half scraified in September. Harrowed in March, Scarified prior to seeding	Gallipoli	Mid-May	50	95	Yes	Yes	Flag Smut and Takeall
Schilling, C. E., and N. S.	4	Salmon and Gimlet	Early June	Disc	3–4	Harrowed in June. Scarified early July. Springtyne cultivated end of July, and September. Scarified early May	Merredin	3rd week May	60	75	Yes	Yes	Flag Smut and Takeall
Mann, R. ...	6	Salmon and Gimlet	Late July and August	Mouldboard	3–4	Springtyne cultivated in September. Scarified and harrowed in early October. Scarified in April	Gluclub	3rd week April	60	112	Yes	Yes	Flag Smut and Takeall
Ellis, E. G. ...	...	Salmon and Gimlet	Early June	Disc	3	Harrowed in July. Disced end of July. Springtyne cultivated early August and again in March and May	Gluclub	Mid-May ...	50	90	Yes	Yes	Flag Smut.
Johnson, W. D.	...	Salmon and Gimlet	July and August	Mouldboard	4	Springtyne cultivated in August and September	Gluclub	End April ...	50	90	Yes	Yes	Flag Smut and Bunt.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
Robins, G. E. & Co.	7	Salmon, Gimlet and Morrell	End of Jan.	Disc	ins. 4	Scarified mid July Harrowed in August Springtyne cultivated in September Harrowed in October	Gluclub	Early May ...	45	112	Yes	Recleaned	Bunt and Take Takeall.
Allen Bros. ...	5	Salmon and Gimlet	June	Rigid-tune Scarifier.	3	Scarified in September Springtyne cultivated in March	Nabawa	Early May ...	50	90	Yes	Yes	Takeall.

ZONE 7.

In this zone three district agricultural societies, Kulin, Lake Grace and Corrigin, conducted crop competitions. The last-named however, failed to forward entries to the Royal Agricultural Society, and the competitors were consequently not eligible to compete for the zone championship prizes.

KULIN DISTRICT AGRICULTURAL SOCIETY.

Judge—J. H. Langfield, Manager, Merredin Expt. Farm.

For this Society's competition 13 crops were inspected and all gave promise of satisfactory yields. The highest yield was calculated at 28 bushels per acre and the lowest at 20 bushels per acre; the average calculated yield for the 13 crops being slightly over 24 bushels per acre.

Ball smut was very bad in several crops and many points were lost on that account. All except one competitor dry pickled, but evidently the operation in several instances had not been carried out thoroughly.

The rainfall registered at the Kulin Post Office is as follows:—

...	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Kulin ...	36	26	134	40	240	371	190	122	24	25	972	327	1	1,536

The awards were made as follows:—

KULIN AGRICULTURAL SOCIETY.

Judge—J. H. Langfield, Manager, Experiment Farm, Merredin.

Competitor.	Variety.	Estimated Yield. 50 pts.	Freedom from Weeds. 10pts.	Freedom from Disease. 10 pts.	Freedom from Admixture. 15 pts.	Evenness of Growth. 15 pts.	Total Points. 100 pts.
J. H. Henderson ...	Queen Fan ...	28	9	9	13	14	73
A. W. Trotter ...	Bena	26	9	9	14	13	71
F. S. Freebairn ...	Queen Fan ...	26	9	9	14	13	71
R. Nicholls	Merredin	26	8	8	14	14	70
Bailey & Russell ...	Hard Federation ...	28	9	6	13	13	69
Bowey & Baldock ...	Merredin	23	9	8	14	14	68
P. J Bowey	Merredin	23	9	9	14	13	68
H. Johnston	Yandilla King ...	24	9	7	14	13	67
M. J. Barry	Bena	23	8	9	13	13	66
Roberts Bros. ...	Hard Federation ...	22	8	9	13	14	66
Howe Bros.	Nabawa	22	9	9	13	12	65
P. Meikle	Merredin	20	9	7	14	13	63
J. McNamara ...	Queen Fan ...	23	8	6	13	13	63

The winning crop was of the variety Queen Fan exhibited by Mr. J. H. Henderson. It was rather a popular variety in this district, last year's competition being also won by this variety. It was a very clean, even crop, with very little weed growth, admixture or disease. It did not appear to have suffered to any great extent for want of spring rains, the grain being plump and the ears well filled.

As was the case in last year's competition, Mr. Trotter secured second prize, this year with a crop of Bena, and although hardly up to the standard of the winner, it was a very fine crop.

Messrs. Bailey and Russell's crop of Hard Federation was calculated to yield equal to the winning crop, but it was very bad with ball smut and lost heavily on that account.

Mr. F. S. Freebairn, who won the competition last year, tied for second place with a very fine crop of Queen Fan, being only 2 points below the winning crop.

The following table summarises the cultural methods adopted by the competitors:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Henderson, J. H.	3	Salmon, Gimlet, and Mallee	July	Good	Rigid tyne scarifier.	3	Springtyne cultivated first week Sept. Harrowed before seeding and planted with combined cultivator-drill.	Queen Fan	Mid May ...	48	112	Dry	Yes	
Trotter, A. W.	Old pdk., many yrs.	Jam ...	June	Good	Disc	3	With 10 furrow disc in Sept. Springtyne before seeding.	Bena	End April ...	60	110	Dry	Yes	
Freebairn, F. S.	2	Morrel, Salmon, and Blackbutt	July	Good	Mouldboard	4	Harrowed 29th Aug. Cultivated with combine 19th Sept., and again Oct. 6th. Light harrows behind combined cultivator-drill at seeding.	Queen Fan	1st week May	60	112	Dry	Yes	
Bailey & Russell	...	Jam and York Gum	July	Good	Disc.	3–4	None	Hard Federation	1st week May	45	120	Dry	Yes	
Bowey & Baldock	3rd crop in 5 years	Salmon Gum	July	Good	Mouldboard	2½	Springtyne cultivated in October. Harrowed March, and planted with combined cultivator drill	Merredin	Mid May ...	50	75	Dry	Yes	
Nicholls, R. ...	Old pdk., many yrs.	Salmon and Gimlet	June	Good	Disc	3–4	Turned back in August. Cultivated September and again before drilling	Merredin	Early May ...	45	90	Dry	Yes	

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Bowey, P. J. ...	3	Salmon and Morrel	July	Good	Disc	3	Twice with springtyne in Spring, and once in April. Planted with combined cultivator drill	Merredin	Mid May ...	55	80	Dry	Yes	
Johnston, H. ...	1	Salmon and Morrel	June	Good	Disc	4	Cultivated in Aug. and sown with combined cultivator-drill	Yandilla King	Mid May ...	45	90	Dry	Re-winnowed	
Barry, M. J. ...	3	Gimlet, Salmon and Morrel	July	Good	Disc	3½	Sundercut in Oct. and cultivated before seeding	Bena	Mid April ...	37	100	No	Yes	
Howe, Bros. ...	7	Jam, Salmon, Gimlet and Morrel	July	Good	Mouldboard	3½	Springtyne cultivated in August, again in Sept., and before seeding Planted with Combined cultivator-drill	Nabawa	Early May ...	56	100	Dry	Re-winnowed	
Meikle, P. ...	...	Gimlet and Salmon	July	Good	Mouldboard	3½	Springtyne cultivated before seeding. Combined and harrowed after	Merredin	Mid May ...	45	90	Dry	Yes	
McNamara, J. ...	3	Jam, York Gum and Gimlet	July	Good	Disc	3½	Springtyne cultivated in Spring. Harrowed twice April, and cultivated ahead of drill	Queen Fan	1st week May...	45	90	Dry	Yes	

LAKE GRACE AGRICULTURAL SOCIETY.

Judge—J. H. LANGFIELD, Manager, Merredin Expt. Farm.

For the above competition nine crops were inspected. The following table gives points awarded:—

LAKE GRACE DISTRICT AGRICULTURAL SOCIETY.

Judge: J. H. Langfield, Manager, Merredin Experimental Farm.

Competitor.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total, 100 points.
O. F. Haddon ...	Nabawa	27	8	9	14	13	71
A. H. Darby ...	Gluyas Early ...	26	8	9	14	13	70
H. Bishop	Nabawa	25	8	9	14	13	69
J. Ley	Gluyas Early ...	23	9	9	14	13	68
H. J. Coad	Nabawa	22	9	9	14	13	67
F. Stephens	Waratah	22	9	9	14	13	67
E. Fry	Bena	21	8	9	14	14	66
C. Griffin	Federation	23	8	8	13	13	65
G. Argent	Nabawa	22	8	8	14	13	65

Mr. O. F. Hadden's crop, which secured first place, was of the variety Nabawa; it was even, well headed and free from disease, and contained very little weed growth. It was calculated to yield 27 bushels per acre.

Mr. A. H. Darby secured second place with a crop of Gluyas Early; unfortunately it had been considerably knocked about by the heavy rains experienced in November and had lodged badly in many places. The calculated yield was 26 bushels per acre.

Mr. H. Bishop was placed third with a crop of Nabawa. This crop was standing very well and had not suffered by the heavy November rains. It was calculated to yield 25 bushels per acre, and, like the first and second crops, showed very little disease or admixture.

The average calculated yield of the nine competing crops in this district was 23 bushels per acre.

The rainfall recorded at Lake Grace is as follows:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Lake Grace	101	43	81	29	192	340	199	102	57	60	950	386	14	1,604

The cropping particulars of the various competitors are as follow:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
Hadden, O. F....	4	Salmon and Blackbutt	Early August	Good	Disc	ins. 4	Disced in September. Harrowed in October. Cultivated with Springtyne cultivator before seeding	Nabawa	End April ...	45	70	Dry	No	
Darby, A. H. ...	4	Blackbutt and Morrel	End June	Good	Mould-board	3½	Duckfoot end of August; three other workings with springtyne cultivator in spring and sown with combined cultivator drill	Gluyas Early	May ...	45	112	Dry	Yes	
Bishop, H. ...	9	Blackbutt, Teatree, and Salmon	July	Good	Disc	3½	Twice in spring with springtyne cultivator and planted with combined cultivator drill	Nabawa	End April ...	45	125	Dry	Yes	
Ley, J. ...	11	Salmon and Gimlet	July	Good	Disc	3	Springtyne cultivated in September and again before planting	Gluyas Early	May	52	75	Dry	Yes	
Coad, H. J. ...	8	Gimlet and Morrel	July, 1927	Good	Disc	3½	Two years fallow. Ploughed twice first year. Cultivated twice following year and before seeding	Nabawa	Mid-May ...	45	150	Dry	Yes	

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted,	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Stephens, F. ...	6 years with 2 years spell before this crop	Salmon and Morrel	June	Good	Mould-board	3–4	Springtyne cultivated in September. Disced after March rain and disced before planting	Waratah	End May ...	45	103	Dry	Yes	
Fry, E. ...	2	Morrel, Tea-tree, and Gimlet	July	Good	Disc	3½	Springtyne cultivated in September. Disced January and again before seeding	Bena	1st week May	42	112	Dry	Yes	
Griffen, C. ...	7	Salmon and Gimlet	July	Good	Mould-board	4	Springtyne cultivated in spring and before seeding	Federation	May	50	112	Formalin	Yes	
Argent, G. ...	3	Salmon, Gimlet, and Blackbutt	August	Good	Ten furrow Disc	3–4	Springtyne cultivated in March and harrowed after drilling	Nabawa	Mid-May ...	50	90	Bluestone	No	

CORRIGIN AGRICULTURAL SOCIETY.

Judge—G. L. THROSSELL, Dip. Agric., Agricultural Adviser.

This Society conducted two local crop competitions, one on heavy land and the other on light land. However, the number of entries obtained was disappointing, there being only five in the former competition and three in the latter.

As elsewhere this season, heavy rains were recorded during the early part of the growing period, but only 74 points were registered in September and October, and consequently the crops did not finish up to earlier expectations, but nevertheless they have yielded very well. The excessive rains of May and June were a disadvantage to the light lands, being responsible for leaching or washing out the nitrates, also lowering the soil temperatures and so retarding growth and root development, particularly in the late sown crops.

The rainfall recorded during the year was as hereunder:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.						May to Oct.	Jan. to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.		
Corrigin ...	28	24	133	13	333	418	177	104	50	24	1,106	1,304
Kurren-kutten	...	...	191	...	320	385	229	87	28	8	1,057	1,248

50 *Acre Competition on Heavy Land.*

The points awarded are as follow:—

CORRIGIN AGRICULTURAL SOCIETY.

HEAVY LAND. Judge—G. L. Throssell, Dip. Agric., Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Bremner, J. R. & Sons	Kurren Kutten	Gluyas Early	25	9	9	14	13	70
McAndrew, R. ...	Corrigin ...	Nabawa ...	23	9	8	13	13	66
Taylor, L. G. ...	Kunjin ...	Nabawa ...	18	9	9	13	12	61
Jewell, J. D. ...	Gorge Rock	Federation ...	20	8	9	10	13	60
Taylor, J. B., Jr.	Kunjin ...	Boolaroo ...	15	8	8	13	13	57

This competition was won by Messrs. J. R. Bremner and Sons, of Kurren-Kutten, following up their previous successes in both the crop and fallow competitions last year. The crop of Gluyas Early submitted was calculated to yield 25 bushels per acre (equivalent to 2.4 bushels per inch of rain in the growing period) and was awarded 70 points. Though not actually on the identical piece of fallow which won the fallow competition, this entry was in the same paddock and received similar treatment to the land which won the fallowing competition. The land was scarified with a rigid tyne cultivator after rain in March, springtyned to kill weeds in June and July, harrowed in August, and scarified in September. The crop was very true to type and except for a little Take-all was free of disease. Whilst it was showing a tendency to lodge, no difficulty was being experienced in handling it with a header harvester.

Mr. R. McAndrew's crop of Nabawa was awarded 66 points, with a calculated yield of 23 bushels. This was a very well grown crop, but lost points for weeds, and the presence of Takeall and Bunt.

It shows that a healthy rivalry exists among the competitors in this district, when Mr. J. D. Jewell, who had already stripped his competition crop, submitted another crop which he anticipated would yield several bushels less than the one already harvested.

The following table shows the cultural details:—

CULTURAL DETAILS (HEAVY LAND).

Competitor.	No years cropped.	Timber.	When fallowed	Implement.	Depth.	Subsequent Cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Disease.
					in.						
Breuner, J. R. & Sons	8	Salmon, Gimlet, Mallee	March	Scarified with rigid tyne cultivator	3	Springtyne cultivated June and July. Harrowed August. Scarified September	Olympic Early ...	3rd week May	47	130	Trace Takeall.
McAndrew, R.	6	Salmon, Gimlet ...	July	Mouldboard ...	4	Springtyned August and September	Nabawa ...	End April ...	52	95	Takeall and Bunt.
Taylor, L. G.	?	Salmon, York Gum	July	Mouldboard ...	4	Tandem disced October and March	Nabawa ...	3rd week May	54	85	Takeall.
Jewell, J. D.	3	Jam, York Gum, Salmon	July	Sundercut ...	4	Scarified with rigid-tyne cultivator September.	Federation ...	Mid May ...	46	90	Takeall
Taylor, J. B., Jnr. ...	?	Jam, York Gum	July	Disc	3	Skim ploughed prior seeding	Booaroo ...	1st week June	54	85	Flag smut Takeall.

All entries dry pickled and graded.

50 Acre Competition on Light Land.

The awards are as follow:—

CORRIGIN AGRICULTURAL SOCIETY.

Judge: G. L. Throssell, Dip. Agric., Agricultural Adviser.

LIGHT LAND.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Abi Bros. ...	Bilbarin ...	Nabawa ...	16	9	9	13	13	60
Ding, J. B. ...	Corrigin ...	Hard Federation	10	9	8	13	14	54
Ding, J. B. ...	Corrigin ...	Merredin ...	9	9	9	12	12	51

The three entries were all on new land fallowed and cropped for the first time. The winners were Messrs. Abi Bros. of Bilbarin, whose crop of Nabawa, calculated to yield 16 bushels, was awarded 60 points.

Mr. J. B. Ding's entry of Hard Federation scored 54 points, and his Merredin 51 points.

The cultural details are shown in the accompanying table.

CULTURAL DETAILS (LIGHT LAND).

Competitor.	Years cropped.	When fallowed.	Depth.	Implement.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Disease.
Abi Bros.	1	July	ins. 3	Disc.	Disced in April	Nabawa	Early May	60	112	
Ding, J. B.	1	June	ins. 4	Disc	Tandem disced prior seeding. Harrowed after	Hard Federation	Early May	45	120	Flag Smut
Ding, J. B.	1	July	ins. 4	Disc	Tandem disced prior seeding. Harrowed after	Merredin	1st wk. June	45	120	Flag Smut

ZONE 8.

Judge—A. S. WILD, B.Sc. (Agric.), Agricultural Adviser.

Two Agricultural Societies, those of Gnowangerup and Wickepin respectively, conducted crop competitions in Zone 8. The entrants in these competitions were eligible to compete in the Royal Agricultural Society's zone competition as also were the four competitors who entered direct with the Royal Agricultural Society.

GNOWANGERUP AGRICULTURAL SOCIETY.

Twenty entries were received in the competition of the Gnowangerup Agricultural Society. Of these sixteen submitted crops for inspection, the awards being as follow:—

GNOWANGERUP AGRICULTURAL SOCIETY.

Judge: A. S. Wild, B.Sc. (Agric.), Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
C. E. Cockram ...	Pallinup ...	Yandilla King	46	9	9	13	14	91
J. McDonald ...	Gnowangerup	Bena ...	41	9	9	14	14	87
H. O. Beck ...	Gnowangerup	Yandilla King	43	8	9	13	13	86
R. Formby & Co.	Gnowangerup	Nabawa ...	38	9	9	13	13	82
Alf. Johnson ...	Gnowangerup	Bena ...	36	9	8	14	14	81
E. Chambers ...	Pallinup ...	Yandilla King	34	9	9	14	13	79
C. E. Barnard ...	Pallinup ...	Yandilla King	35	8	8	14	13	78
J. Baxter ...	Pallinup ...	Major ...	35	8	8	13	14	78
A. Simpson ...	Pallinup ...	Drof ...	35	8	8	13	14	78
A. J. White ...	Pallinup ...	Yandilla King	32	9	9	14	14	78
N. L. F. Davis ...	Pallinup ...	Nabawa ...	35	7	9	14	12	77
C. Taylor ...	Pallinup ...	Yandilla King	32	8	9	14	13	76
W. Lloyd-Wood	Pallinup ...	Nabawa ...	32	9	9	13	13	76
C. A. Whyatt ...	Pallinup ...	Nabawa ...	32	8	8	14	13	75
E. H. Wright ...	Pallinup ...	Yandilla King	31	7	8	14	13	73
E. A. Gillespie...	Pallinup ...	Drof ...	29	8	8	14	13	72

Farley Photos., Gnowangerup.

C. E. Cockram's 50 acres "Yandilla King."
Championship Prize No. 8 Zone; Royal Ag. Soc. Special Prize.
Yield—46 bushels per acre.

Farley Photos., Gnowangerup.

H. O. Beck's 50 acres "Yandilla King." No. 8 Zone.
Yield—43 bushels per acre.

Farley Photos., Gnowangerup.

J. McDonald's 50 acres "Bena." No. 8 Zone.
Yield—41 bushels per acre.

Mr. C. E. Cockram's crop of the variety Yandilla King, which was awarded first place, was calculated to yield 46 bushels per acre. This constitutes an official record for the State and is a further proof of the suitability of this standard late variety in the Gnowangerup and other districts having similar climatic conditions. It was a well-stooled, healthy, even crop, free from disease but containing a percentage of admixture. Planted at the rate of 60 lbs. of seed per acre, the heads were dense, but could have been better developed. Superphosphate was applied at seeding at the rate of 98 lbs. per acre. The land had been ploughed with a mouldboard plough to a depth of 4 inches during July and August of the previous year. It had been springtyne cultivated in October, again in January, and twice again in April. Subsequently it was seeded with a combined cultivator-drill during the third week in May.

Mr. J. McDonald's crop of the variety Bena, which was placed second, was remarkably even, free from weeds, disease and admixture, and was calculated to yield 41 bushels per acre. Although the yield was not equal to that of Mr. H. O. Beck's crop of Yandilla King it gained points awarded under the other sections. Mr. McDonald's crop had been sown during the first week in June at the rate of 55 lbs. of seed with an application of 102 lbs. of superphosphate per acre.

All the sixteen competitors in this Society's competition obtained excellent calculated yields, the average being approximately 35.5 bushels per acre. The district was fortunate in receiving spring rains which unfortunately were not extended over the whole of the wheat belt. In addition the majority of the crops in the district, being late maturing, derived benefit from the early November rains.

The following shows the rainfall as recorded at Gnowangerup and Pallinup during 1929:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Gnowangerup	33	135	121	32	303	309	123	123	150	79	1,087	282	32	1,722
Pallinup (Clear Hills)	7	136	11	43	306	289	86	81	129	74	965	...	...	...

The methods of cultivation and other details are summarised below:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted,	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Cookram, C. E....	Old land	York Gum and Morrel	July and Aug.	Good	Mould-board	4	Springtyne cultivated in October, again in January and again twice in April. Drilled with combined cultivator drill	Yandilla King	3rd week May	60	98	Dry	Yes	
McDonald, J. ...	Old land	Salmon, York Gum and Manna Gum	July	Good	Mould-board	3½–4	Harrowed end of August, springtyne cultivated in September and again in February after rain. Harrowed in early March after rain. Springtyne cultivated ahead of combined cultivator drill	Bena	1st week June	55	102	Dry	Yes	
Beck, H. O. ...	Old land	Morrel and Salmon with some White Gum and Sheoak	Late August	Good	Mould-board	3½	Harrowed and scarified in October. Scarified early in May	Yandilla King	End May ...	45	80	Pickled with Blue-stone	Re-cleaned	
Formby, R. & Co.	3	Morrel and Salmon	July	Good	Mould-board	3½	Disced 2½in. to 3in. deep in September, and harrowed. Harrowed after rain in January. Scarified immediately prior to seeding. Drilled with combined cultivator-drill	Nabawa	Mid-June ...	52	93	Dry	Yes	
Johnson, Alf ...	3	York Gum, Manna-Gum and some White Gum	August	Good	Mould-board	3	Scarified in September and again just before drilling. Harrowed immediately after drilling	Bena	End May ...	50	90	Dry	Yes	Trace Flag Smut.

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
Chambers, E.	4	Mallee, Morrel and White Gum	August	Good	Mouldboard	in 4	Springtyne cultivated in October, harrowed immediately after. Disced 2in. deep in May. Drilled with combined cultivator-drill with light harrows attached.	Yandilla King	4th week May	45	90	Pickled with formalin	Yes	
Barnard, C. E. ...	7	York Gum, White Gum, and some Morrel	July	Good	Mouldboard	4	Springtyne cultivated in September. Drilled with combined cultivator-drill	Yandilla King	Mid-May ...	35	80	Pickled with formalin	Yes	Trace Takeall.
Baxter, J. ...	3	White Gum and York Gum	July	Very Good	Mouldboard	3	Springtyne cultivated and harrowed in August. Springtyne cultivated just prior to seeding	Major	2nd week May	45	90	Dry	Yes	Traces Takeall and Flying Smut.
Simpson, A.	3	York Gum, White Gum, and Morrel	August	Good	Mouldboard	4	Springtyne cultivated in October and again twice in May prior to seeding	Drof	Mid-May ...	45	90	Dry	No	Traces Takeall and Flying Smut.
White, A. J.	2	Morrel, White Gum and York Gum chiefly	August	Good	Mouldboard	4	Springtyne cultivated twice in spring and once in April. Drilled with combined cultivator-drill	Yandilla King	3rd week May	50	95	Pickled with formalin	No	
Davis, N. L. P....	Old land	Morrel, Salmon and York Gum	July and August	Good	Disc	3½	Disced 2in. deep in September. Springtyne cultivated in October. Harrowed early in November. Springtyne cultivated in May. Drilled with combined cultivator drill	Nabawa	1st fortnight July	45	180	Dry	Yes	

CULTURAL DETAILS.—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						ins.								
Taylor, C.	1	York Gum, Morrel White Gum and Black Mallee	July	Good	Mould-board	3½	Mouldboard ploughed 2in. deep in October. Springtyne cultivated with wide points and followed by light harrows in February after rain	Yandilla King	Mid-May ...	45	114	Dry	Yes	
Lloyd Wood, W.	Old land	Morrel and York Gum	August	Excellent	Mould-board	4	Harrowed in September. Disced 4in. deep at end September and again harrowed. Springtyne cultivated three times before seeding	Nabawa	End June ...	45	120	Dry	Yes	
Whyatt, C. A.	4	Morrel and York Gum	August	Good	Mould-board	4	Springtyne cultivated in February and again in May. Harrowed just after drilling	Nabawa	1st week June	45	120	Pickled with formalin	Yes	Trace Takeall.
Wright, E. H.	3	York Gum and Morrel	July	Good	Mould-board	3½	Disced 2in. deep in September. Springtyne cultivated in April and drilled with combined cultivator drill-	Yandilla King	2nd week May	50	80	Pickled with formalin	Yes	Trace Takeall.
Gillespie, E. A.	Old land	York Gum and Morrel	August	Getting hard	Mould-board	3½	Disced 2in. deep in October. Drilled with combined cultivator-drill	Drof	Mid-June ...	60	90	No	Yes	Trace Takeall.

WICKEPIN AGRICULTURAL SOCIETY.

Seven crops were inspected for the competition conducted by the Wickepin Agricultural Society, two competitors having withdrawn.

The following awards were made:—

WICKEPIN AGRICULTURAL SOCIETY.

Judge: A. S. Wild, B.Sc. (Agric.) Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
G. Hemley ...	Wickepin ...	Gallipoli ...	33	8	8	13	13	75
Hosken Bros. ...	Dorakin ...	Turvey ...	28	9	8	13	13	71
H. W. Willcock	Mulyalling ...	Ranee ...	26	9	9	12	13	69
L. C. Dalton ...	Malyalling ...	Free Gallipoli	25	8	8	13	13	67
S. A. Collingswood	Malyalling ...	Gresley ...	22	9	8	13	13	65
Mrs. Munday ...	...	Nabawa ...	23	8	8	13	13	65
Coade & Hewett	...	Ranee ...	23	8	8	13	12	64

The winning crop, of the variety Gallipoli, was that of Mr. G. Hemley and was calculated to yield 33 bushels per acre. It had been planted about the beginning of May at the rate of 58 lbs. of seed per acre, 90 lbs. of superphosphate per acre being applied. This crop was fairly even in growth, contained a small amount of admixture and, except for a few wild oats and drake plants, was fairly free of weed growth.

Messrs. Hosken Bros.' crop of the variety Turvey was placed second, the calculated yield for this crop being 28 bushels per acre. The crop had been planted during the second week of April at the rate of 65 lbs. of seed per acre, together with an application of 112 lbs. per acre of superphosphate.

The rainfall as recorded at Wickepin during the year was as follows:—

—	Jan.	Feb.	Mar.	Apl.	Useful Rains.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total			
Wickepin	38	59	74	59	298	464	163	139	107	44	1,215	217	15	1,677

The methods of cultivation employed by the competitors are as hereunder:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
						in.								
Hemley, G. ...	2	Salmon, York Gum, and Jam	June and July	Good	Mould-board	4	Springtyne cultivated end of Sept. Drilled with combined cultivator-drill with light drag harrows attached	Gallipoli	End April ...	58	90	Dry	Re-cleaned	Trace, Flying Smut.
Hosken Bros. ...	4	Jam, White Gum and Sheoak	Late July	Good	Mould-board	4	Springtyne cultivated in Sept. and drilled with combined cultivator-drill	Turvey	2nd week April	65	112	Dolled with Formalin	Yes	Traces, Take-all and Flying Smut
Willcock, H. W.	5	Salmon and Jam	Late July	Good	Mould-board	4	Disced 2in. deep in Sept., and again before seeding. Drilled with combined cultivator-drill with light drag harrows attached.	Ranee	Mid May ...	60	90	Dry	Re-cleaned	
Dalton, L. C. ...	Old land	Salmon Gum running to York Gum and Jam	July	Good	Mould-board	4	Disced 2in. deep in Sept., and again before seeding	Tree Gallipoli	1st week May...	65	90	Dry	Yes	Trace, Take-all.
Collingswood, S. A.	1	Salmon and White Gum	July	Good	Disc	...	Springtyne cultivated late Sept. Drilled with combined cultivator-drill	Gresley	2nd week May	60	90	Dry	Yes	Traces, Take-all and Flying Smut.
Munday, Mrs. ...	Old land	Morrel and Salmon	Aug.	...	Mould-board	3-4	Drilled with combined cultivator-drill	Nabawa	1st week May	45	110	Dry	Yes	Trace, Take-all.
Coade & Hewett	about 10	Salmon, Morrel, and Jam	July and Aug.	...	Mould-board	3½	Scarified late in Sep. Portion disced 2in. deep early in Mar. and whole scarified before drilling. Drilling followed by light harrows	Ranee	End April ...	48	100	Dry	Yes	Traces, Take-all and Flying Smut.

ROYAL AGRICULTURAL SOCIETY.

The four competitors whose entries were received direct by the Royal Agricultural Society were located in the Broomehill, County Peak, South Caroling and Beverley districts respectively.

The awards were as hereunder:—

Competitor.	Variety.	Yield. 50 points.	Freedom from—			Evenness of growth. 15 points.	Total. 100.
			Weeds. 10 points.	Disease. 10 points.	Admixture. 15 points.		
Roberts, I. B, Broomehill ...	Gresley ...	38	8	8	13	14	81
McLean, John, County Peak	Na awa ...	34	8	9	13	14	78
Richards, T., Sth. Caroling ...	do. ...	30	8	9	14	14	75
Smith, H. D., Leverley ...	do. ...	21	7	9	13	12	62

The crop of Mr. I. B. Roberts, which tied for fourth place in the competition for Zone 8, was of a variety alleged to be Gresley. It secured 81 points out of the possible 100, the yield being calculated at 38 bushels per acre. The fallow on which the crop was grown had been ploughed to a depth of five inches with a mouldboard plough during the June and July of the previous year. It had been harrowed in August, springtyne cultivated in September, and again in March. The crop was planted during the second week in May with a combined cultivator-drill and harrowed immediately after. Seed was planted at the rate of 70 lbs. per acre and superphosphate applied at the rate of 112 lbs. per acre.

Unfortunately the seed had not been treated for the prevention of Ball Smut and consequently a trace of this disease was present.

The following table shows the rainfalls as recorded at the official stations nearest to the competitors:—

--	Jan.	Feb.	Mar.	Apl.	Useful Rains.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total			
Broomehill	8	136	12	47	369	403	174	144	149	93	1,332	422	34	1,991
County Peak (Bally Bally)	28	57	61	13	218	382	203	126	84	62	1075	145	...	1,379
Sth. Caroling (Quairading)	10	94	120	5	300	349	185	101	49	21	1,005	135	17	1,386
Beverley	54	114	45	21	294	415	194	157	62	24	1.144	193	9	1.580

The cropping details of the various crops are as hereunder:—

CULTURAL DETAILS.

Competitor.	No. years cropped.		Timber.	When fallowed.	Condition of land.	Implement	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of seed.	Rate of super.	Treated.	Graded.	Disease.
							in.								
Roberts, I. B. ...	Old	land	York Gum and Jam	June and July	Excellent	Mouldboard	5	Harrowed in Aug. Springtyne vated in Sept., and again in Mar. Drilled with combined cultivator-drill and harrowed	Gresley ?	2nd week May	70	112	No	Yes	Traces, Fly-ing and Smut. Smut, Ball
McLean, John ...	Old	land	Salmon and Morrel	Aug.	Fair	Mouldboard	4	Springtyne cultivated twice in Spring and once in autumn. Disced 2in. deep just before seeding. Harrowed just after drilling	Nabawa	10th June ...	65	120	Dry	Yes	
Richards, T. ...	Old	land	Salmon, Gimlet, and Morrel	July	Good	Mouldboard	4–4½	Springtyne cultivated twice in Spring and twice in Autumn. Drilled with a combined cultivator drill	Nabawa	End May ...	49	130	Dry	Yes	
Smith, H. D. ...	Old	land	Jam and York Gum	July	Good	Mouldboard	4	Springtyne cultivated in Spring and again in Autumn. Drilled with combined cultivator-drill with light drag harrows attached	Nabawa	1st week May	60	76	Dry	Yes	

ZONE 9.

Judge—I. THOMAS, Superintendent of Wheat Farms.

In previous years no competitors were forthcoming from districts located in this zone because the climatic and other conditions are very dissimilar to other districts with which they would have competed, and subsequently they did not take an active interest in the competition.

With the creation of a new zone embracing the Esperance and the Ravensthorpe areas, keen friendly rivalry now exists. This is commendable and will do much to standardise and improve the methods adopted.

The Ravensthorpe Agricultural Society conducted a local competition, but as this is not an affiliated Society it was necessary for all competitors participating in the Zone competition from this area to enter direct with the Royal Agricultural Society. The Southern Mallee Agricultural Society being affiliated, the winners of the local crop competition automatically became eligible to compete for the Zone championship awards.

The awards made are as follow:—

SOUTHERN MALLEE AGRICULTURAL SOCIETY.

Judge : I. Thomas, Superintendent of Wheat Farms.

Competitor.	Address.	Variety.	Yield. 5 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
F. Haywood ...	E. Dowak	Nabawa ...	19	9	9	12	14	63
H. S. Sharpe ...	Treslove ...	Nabawa ...	17	9	9	13	14	62
L. Macben ...	Circle Valley	Nabawa ...	18	8	8	13	12	59
J. P. Shaw ...	Salmon Gums	Yandilla King	16	9	9	12	12	58
N. McCrea ...	Salmon Gums East	Nabawa ...	15	9	9	12	12	57
E. Erdman ...	Red Lake ...	Nabawa ...	13	9	9	14	11	56
L. Webster ...	Dowak ...	Gallipoli ...	14	9	9	11	12	55
J. McCosh ...	Kumarl ...	Nabawa ...	14	9	9	11	12	55
R. B. Johns ...	Grass Patch	Gluyas Late	14	8	8	12	12	54
C. Flintham ...	Scaddan ...	Canberra ...	11	8	9	14	11	53
A. Sioldas ...	Dowak ...	Nabawa ...	11	8	9	12	12	52

It will be noticed that the competitors were well scattered throughout the Esperance wheat area from Kumarl in the North to Treslove and Scaddan in the South. It will also be noticed that the midseason varieties were most prominent. In view of the climatic conditions which were experienced, particularly towards the latter part of the growing season, this is somewhat different from what would be expected, and it would appear, when the dates of planting are perused, that the time of planting is an important factor. In this district, where the rainfall varies greatly in the North from that in the South, the settlers would be well advised to pay particular attention to the times of planting the different maturing varieties.

Another factor to which attention should be drawn is the treatment of the fallowed land. It was very noticeable when travelling through the district that many of the fallows were too "flat," the mulch too shallow and inclined to set, and it appeared to the writer that the harrows had been used where it would have been preferable to have had the springtyne cultivator. The soil (not the Kopi) in this district, is of such a nature that it becomes fine too readily. Consequently the treatment of the ploughed land should be such as will tend to keep the mulch (about 2 inches deep) in a rough and loose condition, particularly during the early months of the fallowed period.

T. Haywood's Winning Crop of "Nabawa", No. 9 Zone.
Calculated yield—19 bushels.

The rainfall as recorded at the different centres is hereunder:—

	Jan.	Feb.	Mar.	Apl.	Useful Rains.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Salmon Gums	108	70	56	26	117	201	135	133	21	43	650	184	33	1,127
Grass Patch	120	97	94	15	248	239	139	193	13	63	895	241	71	1,533
Dowak ...	...	...	74	14	131	217	130	88	13	38	617	153	53	911
Scaddan	119	64	69	43	218	293	133	87	47	55	833	283	116	1,527

The cultural details of the competing crops are summarised hereunder:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
						ins.								
Haywood, T. ...	1	Gimlet, Silver Mallee and Tea-tree Scrub	August	Good	Disc	3–4	*Nil*	Nabawa	Last week April	45	75	Dry	Yes	Trace of Ball Smut.
Sharp, H. S. ...	1	Light Mallee and Scrub	June-July	Good	Disc	3–4	Cross disced in March	Nabawa	1st week May	45	80	Dry	No	
Machen, L. D. ...	3	Salmon Gums and Heavy Mallee	June	Good	Disc	4½	Disced in September. Harrowed prior to seeding	Nabawa	Early May ...	45	90	Dry	No	Trace of Take-all and Loose Smut.
Shaw, J. F. ...	1	Black Mallee, Broom Bush, Yorrell	July-August	Good	Disc	4	Harrowed in March after rain. Springtyne cultivated prior to seeding	Yandilla King	Last week April	45	90	Dry	Yes	
McCrea, N. J. ...	1	Silver Gum and Gimlet, Mallee, Tea-tree Scrub	June-July	Good	Disc	3	Cross disced March and April	Nabawa	2nd and 3rd weeks May	45	93	Dry	Yes	Trace Loose Smut.
Erdman, E. ...	1	Stunted Mallee	June	Good	Disc	4	Cross disced in September. Harrowed after rain in January. Scrub raked in February. Springtyne cultivated prior to drilling	Nabawa	1st week May	45	90	Dry	Yes	
Webster, J. L. ...	1	Mallee, Whip Stick, Gimlet, Broombush	October	Good	Rigid-tyne	3	Rigid-tyne cultivated in September. Harrowed in March and again in April	Gallipoli	3rd week April	35	80	Dry	Yes	

CULTURAL DETAILS—*continued.*

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of land.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease
						ins.								
McCosh, J. ...	2	Light Gimlet and Salmon Gum	August	Hard	Disc	3	Springtyne cultivated and harrowed early April	Nabawa	End of April	45	85	Dry	Yes	
Johns, R. B. ...	2	Mallee and Scrub	June-July	Hard	Mouldboard	4½	Rigid-tyne cultivated after ploughing. Harrowed during summer and rigid-tyne cultivated before seeding	Gluyas Late	Early April ...	60	60,90	Dry	No	Trace of Take-all.
Flintham, A. ...	1	Mallee ...	May, 1928	Good	Disc	3	Re-ploughed October and again prior to seeding	Canberra	2nd week May	48	90	Bluestone	Yes	
Sioldas, A. ...	1	Merrit, Silver Bark, Mallee and Tea-tree Scrub	August	Patches hard	Disc	3–3½	Harrowed with heavy harrows after rain January. Planted with combined cultivator-drill	Nabawa	1st week May	45	90	Dry	No	

PHILLIPS RIVER AGRICULTURAL SOCIETY.

This Society conducted a local competition, the area of each competing plot being 25 acres. This included those competitors who also competed in the Zone competition and whose area was, of necessity, 50 acres.

The awards made are as follows:—

PHILLIPS RIVER AGRICULTURAL SOCIETY.

Judge—I. Thomas, Superintendent of Wheat Farms.

Competitor.	District.	Variety.	Yield. 50 points.	Freedom from Weeds. 10 points.	Freedom from Disease. 10 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 15 points.	Total. 100 pts.
Campbell, J. ...	Ravensthorpe	Yandilla King	17	7	8	13	12	57
Reynolds, W. E.	Ravensthorpe	Nabawa ...	16	7	8	12	12	55
Barrett Bros. ...	Ravensthorpe	Nabawa ...	11	9	9	14	11	54
Chapman, I. J.	Kulin a ...	Yandilla King	13	9	9	11	12	54
Bennett, E. T.	Kuliba ...	Dena ...	15	7	8	10	12	52
Smith and Sons	Kuliba ...	Nabawa ...	13	9	6	12	11	51

It will be noted that in this competition no crops of early maturing varieties were inspected.

It was somewhat surprising that the winning crop (located as it was in the Northern end of the district) was of the late variety Yandilla King. This crop, although it had suffered somewhat owing to insufficient rain, had not suffered nearly to the same extent as earlier maturing crops in the locality. It is quite evident that factors other than that of the variety accounted for this.

The land on which the winning crop was grown had been prepared by being mouldboard ploughed early in August to a depth of 3 inches. It was subsequently springtyne cultivated at the end of September and early October, again after rain in January and before seeding, which took place the first week in May. The seed was sown at the rate of 45 lbs. per acre, and superphosphate was applied at the rate of 107 lbs. per acre.

The crop of Nabawa which was placed second was well grown for the main part, but it was apparent that it had also suffered owing to the scanty seasonal rains. It was planted with 60 lbs. of seed with an application of 60 lbs. of superphosphate during the first week in June.

Like the Esperance area, the rainfall differs considerably in the Southern portion of the district from that in the Northern end, and consequently particular attention should be given to the varieties and the time of planting them. In this connection, the planting of portion of the area in the Northern area with earlier varieties is recommended.

The rainfall as recorded at Ravensthorpe is set out in the table below:—

—	Jan.	Feb.	Mar.	Apl.	Useful Rains.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
Ravensthorpe	120	87	84	34	223	188	106	94	72	69	752	227	75	1,379

The following are the cultural details of the competing crops:—

CULTURAL DETAILS.

Competitor.	No. years cropped.	Timber.	When fallowed.	Condition of Land.	Implement.	Depth.	Subsequent cultivations.	Variety.	Planted.	Rate of Seed.	Rate of Super.	Treated.	Graded.	Disease.
						ins.								
Campbell, J. ...	5	Jam and Mallee	August	Good	Mouldboard	3	Springtyne cultivated end September and early October and in January after rain and before seeding	Yandilla King	1st week May	45	107	Formalin	Yes	Trace of Take-all.
Reynolds, W. E.	3	Mallee and Broom Bush	July	Good	Mouldboard	4	Springtyne cultivated in August, again September, and again prior to seeding	Nabawa	1st week June	45	60	Dry	No	Trace of Take-all.
Barrett Bros. ...	1	Salmon Gum, Gimlet and Mallee	July	Good	Disc	3	Cross disced September and October, again early March before rain. Springtyne cultivated before seeding	Nabawa	Middle May ...	56	83	Dry	Yes	
Chapman, I. J.	1	Scrub plain	August	Good	Disc	3	Cross disced in February	Yandilla King	2nd week May	60	90	Dry	Yes	
Bennett, E. T. ...	Old land	Sandy river Flat Yate and Xmas tree	November	Hard	Disc	3	Slim plough prior to seeding	Bena	Late May ...	45	120	Dry	Yes	Trace of Rust.
Smith & Sons ...	1	Scrub plain	July	Good	Disc	3	Cross disced in March	Nabawa	Early June ...	54	90	Dry	Yes	Portion Bad with Smut.

ROYAL AGRICULTURAL SOCIETY ZONE CHAMPIONSHIP AWARDS.

The entrants for these championship prizes are the first and second prize winners of the district Agricultural Societies' competitions, and also those competitors who entered direct with the Royal Agricultural Society. Some societies, however, did not comply with the conditions, and therefore were not eligible to compete.

The competitors in the different zones, together with the points allotted, are shown in the table hereunder:—

REPRESENTATIVES FROM DISTRICT AGRICULTURAL SOCIETYS' COMPETITIONS AND ENTRIES RECEIVED DIRECT BY ROYAL AGRICULTURAL SOCIETY.

Competitor.	Society.	Variety.	Yield. 50 pts	Freedom from Weeds. 10 pts.	Freedom from Disease. 10 pts.	Freedom from Admixture. 15 pts.	Evenness of Growth. 15 pts.	Total. 100 pts.
ZONE 1.—Judge: F. L. Shier, B.Sc. (Agric.), Agricultural Adviser.								
Lucas, F. ...	Royal ...	Nabawa ...	27	9	9	14	13	72
Forrester, J. K.	Royal ...	Bena ...	26	9	9	14	13	71
Robertson, R. ...	Royal ...	Merredin ...	25	8	9	14	13	69
Bowman, J. ...	Royal ...	Merredin ...	26	8	7	14	13	68
Johnson, I. ...	Royal ...	Nabawa ...	24	8	9	14	13	68
Cuming Bros. ...	Royal ...	Nabawa ...	23	8	8	13	13	65
Green Bros. ...	Royal ...	Merredin ...	22	8	8	14	13	65
ZONE 2.—Judge: F. L. Shier, B.Sc. (Agric.), Agricultural Adviser.								
Bradford Bros.	Dalwallinu ...	Gluyas Early	29	9	9	14	13	74
Moore, T. ...	Royal ...	Nabawa ...	27	9	9	14	14	73
Beilby A. H. ...	Dalwallinu ...	Gluyas Early	26	9	9	14	14	72
ZONE 3.—Judge: A. S. Wild, B.Sc. (Agric.), Agricultural Adviser.								
Armstrong, W. N.	Wongan Hills	Nabawa ...	30	9	9	13	14	75
Fowler, G. F. ...	Wongan Hills	Clubhead ...	31	8	9	13	13	74
Williams, G. J....	Dowerin ...	Gluyas Early	26	8	8	13	14	69
Cosh, E. C. ...	Dowerin ...	Nabawa ...	24	9	9	13	13	68
ZONE 4.—Judge: R. P. Roberts, B.Sc. (Agric.), Agricultural Adviser.								
Fitzpatrick, R. C.	Nungarin ...	Gluyas Early	25	9	8	14	13	69
Young, G. T. ...	Nungarin ...	Gluyas Early	22	8	8	14	13	65
Collins, M. C. ...	Mt. Marshall	Nabawa ...	22	8	9	12	12	63
Hopwood, B. W. G.	Mt. Marshall	Gluyas Early	18	9	8	13	13	61
ZONE 5.—Judge: G. L. Throssell, Dip. (Agric.), Agricultural Adviser.								
Cook, W. ...	Merredin ...	Nabawa ...	26	9	9	13	14	71
Teasdale, H. W.	Merredin ...	Nabawa ...	25	9	9	14	13	70
Prowse Bros. ...	Doodlakine-Laandee	Nabawa ...	22	9	9	14	13	67
Reynolds, M. H.	Royal ...	Gresley ...	20	9	9	14	13	65
Prowse, E. W.	Doodlakine-Laandee	Gluyas Early	20	8	8	14	13	63
ZONE 7.—Judge: J. H. Langfield, Manager, Experiment Farm, Merredin.								
Henderson, J. H.	Kulin ...	Queen Fan ...	28	9	9	13	14	73
Haddon, O. F. ...	Lake Grace ...	Nabawa ...	27	8	9	14	13	71
Trotter, A. W. ...	Kulin ...	Bena ...	26	9	9	14	13	71
Darby, A. H. ...	Lake Grace ...	Gluyas Early	26	8	9	14	13	70
ZONE 8.—Judge: A. S. Wild, B.Sc. (Agric.), Agricultural Adviser								
Cockram, C. E.	Gnowangerup	Yandilla King	46	9	9	13	14	91
McDonald, J. ...	Gnowangerup	Lena ...	41	9	9	14	14	87
Roberts, I. B. ...	Royal ...	Gresley ? ...	38	8	8	13	14	81
McLean, J. ...	Royal ...	Nabawa ...	34	8	9	13	14	78
Richards, T. ...	Royal ...	Nabawa ...	30	8	9	14	14	75
Hemley, G. ...	Wickepin ...	Gallipoli ...	33	8	8	13	13	75
Hosken Bros. ...	Wickepin ...	Turvey ...	28	9	8	13	13	71
Smith, H. D. ...	Royal ...	Nabawa ...	21	7	9	13	12	62
ZONE 9.—Judge: I. Thomas, Superintendent of Wheat Farms.								
Haywood, T. ...	Southern Mallee	Nalawa ...	19	9	9	12	14	63
Sharpe, H. S. ...	Southern Mallee	Nabawa ...	17	9	9	13	14	62
Campbell, J. ...	Royal ...	Yandilla King	17	7	8	13	12	57
Reynolds, W. F.	Royal ...	Nalawa ...	16	7	8	12	12	55
Chapman, I. J.	Royal ...	Yandilla King	13	9	9	11	12	54
Smith & Sons ...	Royal ...	Nalawa ...	13	9	6	12	11	51

LEADING COMPETITORS FOR ROYAL AGRICULTURAL SOCIETY'S SPECIAL PRIZE FOR HIGHEST YIELD IN ANY ZONE.

Zone.	Competitor.	Address.	Variety.	Calculated Yield.
				bush.
8	C. E. Cockram	Pallinup	Yandilla King	46
8	H. O. Beck	Gnowangerup	Yandilla King	43
8	J. McDonald	Gnowangerup	Bena	41
8	R. Formby & Co. ...	Gnowangerup	Nabawa	38
8	I. B. Roberts	Broomehill	Gresley	38
8	A. Johnson	Gnowangerup	Bena	36
8	C. E. Barnard	Pallinup	Yandilla King	35
8	J. Baxter	Pallinup	Major	35
8	A. Simpson	Pallinup	Drof	35
8	N. L. P. Davis	Pallinup	Nabawa	35
8	E. Chambers	Pallinup	Yandilla King	34
8	J. McLean	Beverley	Nabawa	34
8	G. Henley	Wiekepin	Gallipoli	33
8	A. J. White	Pallinup	Yandilla King	32
8	C. Taylor	Pallinup	Yandilla King	32
8	W. Lloyd Wood ...	Pallinup	Nabawa	32
8	C. A. Whyatt	Pallinup	Nabawa	32
8	E. H. Wright	Pallinup	Yandilla King	31
3	G. F. Fowler	Wongan Hills	Clubhead	31
3	Mt. Rupert Co. ...	Wongan Hills	Gresley	30
3	W. N. Armstrong ...	Wongan Hills	Nabawa	30
3	T. Richards	South Caroling	Nabawa	30
2	Bradford Bros.	Ballidu	Gluyas Early	29
8	E. A. Gillespie	Pallinup	Drof	29
7	J. H. Henderson ...	Kulin	Queen Fan	28
7	Bailey & Russell ...	Kulin	Hard Federation ...	28
3	A. E. Parker	Wongan Hills	Nabawa	28
8	Hosken Bros.	Dora lin	Turvey	28
3	Smith & Nunn	Wongan Hills	Nabawa	27
1	F. Lucas	Carnamah	Nabawa	27
2	T. Moore	Indarra	Nabawa	27
7	G. F. Haddon	La e Grace	Nabawa	27
7	A. W. Trotter	Kulin	Bena	26
7	F. S. Freebairn	Kulin	Queen Fan	26
7	R. Nicholls	Kulin	Merredin	26
1	J. K. Forrester	Carnamah	Bena	26
7	A. H. Darby	La e Grace	Gluyas Early	26
1	J. Bowman	Carnamah	Merredin	26
2	A. H. Beilby	Ballidu	Gluyas Early	26
3	G. J. Williams	Hindmarsh	Gluyas Early	26
8	H. W. Willcock	Malvalling	Ranee	26
5	W. Cook	South Walgoolan ...	Nabawa	25
1	R. Robertson	Carnamah	Merredin	[illegible]
5	H. W. Teasdale	Totadgin	Nabawa	25
2	F. C. Locke	Dalwallinu	Merredin	25
2	H. Locke	Pithara	Golden King	25
4	R. C. Fitzpatrick ...	Nungarin	Gluyas Early	25
3	J. H. Ackland	Wongan Hills	Nabawa	25
8	L. C. Dalton	Malvalling	Free Gallipoli	25
7	H. Bishop	Lake Grace	Nabawa	24

OBJECTS OF THE COMPETITION.

The improvement of the standard wheat-farming methods practised throughout the Wheat Belt is the ultimate objective of those responsible for the conducting of the wheat crop competitions. A spirit of friendly rivalry is engendered and competitors and others set themselves to follow those more successful than themselves. The methods of successful farmers in all districts are tabulated for inspection, the good farmers of the State receive recognition of their ability, and consequently a standard of practical wheat farming is established. It is demonstrated that where recommended methods are employed, reasonable success follows. The conducting of crop competitions is also a means whereby the farmer is brought into closer contact with the officers of the Department of Agriculture.

THE SEASON.

The season under review was the cause of much anxiety.

The seasonal rains commenced early in May. This enabled the crops to be planted under ideal conditions. Favourable conditions continued until the end of June. During July the rainfall was scanty, but no alarm was felt. The lack of rain in August, however, gave cause for anxiety. At the end of that month the crops were showing signs of distress, and as the adverse conditions continued during September, the position was viewed most seriously, and it was feared that the season which was most promising during the early part would end with disastrous results. In October belated rains were experienced in some parts of the wheat belt. In the early districts where this rain fell it was too late to be of any use. In the Southern and other late districts further late rains were experienced, and in consequence the yields obtained exceeded those of last year.

Despite the adverse conditions which prevailed throughout portion of the growing period, the results in all districts are excellent, and would again indicate that the State average of 10 to 11 bushels can be considerably increased when sound farming methods are practised.

ENTRIES.

The total number of competing crops eligible to compete for the Zone Championship Awards was 143, compared with 114 the previous year and 160 in 1927. This increase in a year of scanty rainfall indicates that the competition is not lacking in interest.

Entries were received from twelve district Agricultural Societies, whilst nineteen entries were received direct by the Royal Agricultural Society.

In addition, six societies conducted local competitions. These included 66 competitors not eligible to compete for the Royal Agricultural Society's Zone prizes. Thus the total number of competing crops inspected in all competitions was 209 against 145 of the previous year.

FALLOWING.

All the competitors ploughed (fallowed) their land for their competition plot during the months of June, July or August of the previous year. In this connection it has been demonstrated by experiments that a higher yield may be expected from the land when ploughed early in the fallowing season than when ploughed later. From an experiment conducted at the Merredin Experiment Farm during the past five years, the average results show that an increase of four bushels sixteen pounds per acre was obtained from the plots fallowed in June as compared with the plots ploughed in August.

The average depth of the initial ploughing was from three to four inches, both disc and mouldboard ploughs being used for this operation. The advantage of using either type of implement is determined by the type and condition of soil to be ploughed. Whether the disc or the mouldboard plough be selected, it is essential that the work be done thoroughly.

It is particularly pleasing to note that many of the competitors are appreciative of the value of sheep to assist in controlling weed growth on the fallowed land.

Some of the reasons for fallowing are the conservation of moisture, the destruction of weed growth, the enrichment of the soil's supply of plant food, the control of disease, and the preparation of a suitable seed bed. Since the majority of the competitors are farming with these objects in view, it is not surprising to find a striking similarity between the methods adopted for the preparation of the seed bed. The springtyne cultivator was the implement chiefly used for the cultivation subsequent to the initial ploughing. A disc implement, however, was favoured for cultivations where the land was hard or weedy.

DISEASES.

Although reliable preventative methods are available for the prevention of Ball Smut, there are still some farmers who are not successful in entirely preventing this disease. The most popular method of treating the wheat is the dry method with copper carbonate. When correctly applied, this method is effective in preventing the disease. It has the additional advantage that the seed can be treated immediately after harvest, and when treated the copper carbonate acts as a preventative against vermin.

Although the majority of the competitors adopted the dry method, all of those who used it were not successful. The highly satisfactory results which many have obtained with this treatment indicate that failure with it is due to some defect in the methods of application. Effective results can only be obtained when the seed is dusted thoroughly with the powder. Those working the machines for treating the seed are sometimes inclined to treat the work as a "rush" job, and in consequence the grain is not covered as thoroughly as it should be.

The disease "Flag Smut" was noticed in a number of crops inspected. This disease is becoming rather prevalent, and, unless steps are taken to control it, will become most serious. It is more difficult to control than "Ball Smut," because it is usually transmitted by soil infection and not by the seed. The foliage of infected plants is carried by the wind, and consequently the soil of previously clean fields becomes infected. As a precaution it is advisable to treat the seed with dry copper carbonate, but if the seed is planted on infected land it is not effective. Some varieties are highly resistant to this disease. It is fortunate that the standard midseason variety "Nabawa" is included in these, as is also the late maturing variety, "Yandilla King." Unfortunately the standard early variety, "Gluyas Early," which has proved such an excellent variety suitable for the greater part of the wheat belt, particularly in the early and drier districts, is very susceptible as are also other favoured early maturing varieties, including "Canberra" and "Merredin." The varieties "Carrabin" and "Geeralying," however, both early maturing, are highly resistant and are recommended for planting on infected areas.

The cutting of infected crops for hay and feeding to stock on the farm should not be practised as it does not assist to control the disease, as is generally supposed, but helps to spread the disease over the farm.

As an adidtional precaution, and particularly when resistant varieties are not available or are unsuitable for the special climatic conditions, the land for the next crop should be fallowed in the early winter months—

June and July—and all weed growth which may appear on the fallowed land destroyed either by sheep or by cultivation. It is also advisable, where possible, to grow a crop of oats between the two crops of wheat.

Summarised, the method of control recommended is as follows:—

1. Fallow, and fallow early.
2. Destroy all weed growth on the fallow.
3. Plant resistant varieties.
4. Plant as late as is safe to plant in the sowing season.
5. Treat the seed as for "Ball Smut."
6. Discontinue feeding to stock hay from infected areas.
7. Include a crop of oats in the cropping rotation of the farm.
8. Burn the stubble of infected crops.

Some crops were also attacked by the disease "Take-all." Unfortunately no variety, as yet, is known to be resistant to this disease, and its control, therefore, depends entirely on the farming practice adopted. Suitable methods for the control of "Take-all" are similar to those already recommended for the control of "Flag Smut." In addition, planting as late as is safe in the sowing season is beneficial. Early fallowing and late sowing should, therefore, be the methods adopted to control this disease.

The occurrence of Flying or Loose Smut of wheat is more difficult to prevent. Fortunately, it is unusual for crops to be seriously affected by this disease. The treatment of the seed for the control of Flying Smut of wheat cannot be economically undertaken. A reasonable control, however, is to be expected by planting clean seed from clean crops.

The disease "Septoria" is liable to occur in crops of early varieties of wheat planted too early. Under these conditions there is a tendency for the plants to make rank and flaggy growth, and as a result they become more susceptible to infection by the fungus. The control of "Septoria" consists of seasonable planting and the practice of the clean farming methods recommended for the control of "Flag Smut" and "Take-all." The inclusion of an oats crop in the rotation is also beneficial.

VARIETIES.

As in previous years the most popular variety was Nabawa, 74 of the 209 competing crops being planted with this standard midseason variety. Forty-six competitors planted the standard early variety Gluyas Early. The previous year (1928), of the total number of competitors, 114, thirteen competitors planted this variety. To some extent this increase is due to the inclusion in this report of the details of competitions conducted in the more Eastern districts. The suitability of Gluyas Early for districts of scanty rainfall has been demonstrated over a period of years.

Twenty-one competitors planted the early maturing variety Merredin.

The variety Gluclub was planted by eleven competitors, all of whom were located in the Bruce Rock area.

Eleven competitors also planted the standard late variety Yandilla King. A crop of this variety again secured the Royal Agricultural Society's special prize for the highest yield in any zone.

Eight crops were planted with the variety Bena, five with Gresley and four with Gallipoli. The varieties Canberra, Hard Federation, Ford and Queen Fan were each represented by three competitors. Two competing crops were planted with variety Waratah and the same number with Drof and Ranee respectively.

The remaining varieties represented in the competition, viz., Gluyas Late, Golden King, Clubhead, Dollar, Toby's Tusk, Pusa, Boolaroo, Major and Turvey were each planted by one competitor only.

TIME OF SEEDING.

The period during which the various crops were planted extended over the months of April, May and June.

The following table shows the time at which the crops in the various zones were shown, the figures referring to those on fallowed land only.

Zone.	Number of Competitors.	Number of Competitors planting during—					
		April.	First fortnight May.	Middle of May.	Last fortnight in May	June.	Unknown.
1	7	...	3	2	2	...	...
2	15	5	4	5	...	1	...
3	35	6	18	2	6	2	1
4	19	9	7	...	2	1	...
5	38	9	17	7	5	...	...
7	30	5	8	11	3	2	1
8	27	3	7	4	6	7	...
9	17	5	7	2	1	2	...
Totals	188	42	71	33	25	15	2

One hundred and twenty-nine of the competitors planted during the month of May, 42 in April and 15 in June. It has been demonstrated in experiments that when it is necessary, owing to the area to be sown, to seed outside the month of May, it is better to plant suitable varieties in April rather than to extend the period of planting into June.

RATES OF SEEDING.

The quantities of seed sown varied from 20 lbs. to 70 lbs. per acre. The table hereunder shows the rates employed in each zone, no reference being made to the crops grown on non-fallowed land:—

Zone.	Number of Competitors.	Number of Competitors using—				
		Under 45lbs. per acre.	45lbs. per acre.	45lbs. to 60lbs. per acre.	Over 60lbs. per acre.	Unknown.
1	7	...	1	6	...	...
2	15	...	1	14	...	...
3	35	1	13	20	...	1
4	19	10	1	7	1	...
5	38	7	14	16	1	...
7	30	2	12	15	...	1
8	27	1	9	14	3	...
9	17	1	11	5	...	...
	188	22	62	97	5	2

The majority of the competitors planted from 45 lbs. to 60 lbs. per acre. Experimental results indicate that, while the yield is not decreased by heavier rate of seeding, no advantage is gained by increasing the amount over 45 lbs. per acre.

FERTILISERS.

All the competitors applied superphosphate, the average rate on all competition crops on fallowed land being 94 lbs. per acre. The rates applied varied from 50 lbs. up to 180 lbs. per acre.

The table below shows the quantities and average amounts used in each zone, the averages being compared with those of the previous two years.

Zone.	Number of Competitors.	Number of Competitors using—					Average rates in lbs. per acre.		
		Under 80lbs. per acre.	80 to 99lbs. per acre.	100 to 119lbs. per acre.	Over 120lbs. per acre.	Unknown.	1929.	1928.	1927.
1	7	...	2	4	1	...	107	108	123
2	15	7	5	3	...	...	80	86	69
3	35	4	15	9	6	1	97	102	90
4	19	6	12	1	...	...	82	91	81
5	38	7	31	6	...	...	92	91	86
7	30	3	10	10	6	1	102	92	85
8	27	1	15	6	5	...	101	102	87
9	17	3	12	1	1	...	88	...	...
	188	25	102	40	19	2	94	90	86

The average rate applied per acre by all competitors was 94 lbs. per acre, this being an increase over the average rate for the previous year.

Experiments at the various experiment farms have shown that increased yields are obtained when the heavier dressings of superphosphate up to 150 lbs. per acre are applied.

YIELDS.

The table below shows the comparison between the yields for the 1929-30 season and the previous two seasons.

Zone.	Number of Competitors.	Average Calculated Yields.		
		1929.	1928.	1927.
1	7	24·7	29·0	28·0
2	15	22·5	19·3	22·4
3	35	23·4	21·3	25·6
4	19	18·2	18·3	29·2
5	38	21·9	20·4	26·2
7	30	22·0	23·0	25·6
8	27	32·2	31·1	32·0
9	17	14·5	...	...
	188	20·7	22·5	26·9

The average calculated yield for all competing crops on fallowed land inspected this year was 20.7 bushels per acre; that for 1928, 22.5 bushels; for 1927, 26.9 bushels; and for 1926, 24.5 bushels per acre.

The crops competing for the Royal Agricultural Society's awards gave an average calculated yield of 23.3 bushels per acre against the 22.5 bushels of the previous year.

This is sufficient to show that even a year of adverse climatic conditions reasonable yields can be obtained when advocated and proved methods of agriculture are practised.

BLACKLEG IN CATTLE IN WESTERN AUSTRALIA.

A. F. Flood, M.R.C.V.S., Dip. Ag.

Blackleg or Symptomatic Anthrax is an acute infectious disease which occurs amongst young cattle and sheep grazing on old, rich, low-lying permanent pastures. The disease is due to a germ, the Bacillus Chauveoi, which lives in the soil. This germ is about 1/250th of a millimetre long by 1/1000th of a millimetre broad.

Blackleg has occurred in West Australian dairy cattle in the South-West coastal swamps and river flats. It usually occurs during April and May in dry years. Certain seasons appear to be favourable to the development of the bacillus, which multiplies in a favourable environment. The disease appears and disappears suddenly; several years may intervene between outbreaks.

Symptoms (or signs) of the disease in affected stock are usually acute and lead to death in 48 hours or less. First there is an elevation of temperature to 107 deg. F., loss of appetite, dullness, lameness usually develops in one leg. A fore or hind leg may be attacked or the submaxillary space under and between the branches of the lower jaw. The last situation is uncommon. Usually lameness occurs and on examination of the affected leg an emphysematous (gas distended) swelling may be found on the shoulder if in the foreleg or on the quarter or hip in the hind leg. The skin over the swellings is parchment like and when pressed gas can be felt in the tissues underneath. The swellings are usually about the size of a football. If cut into, the muscles appear dry, porous, and black, and in between the muscles a frothy bloody serum accumulates. The affected muscles have an odour of sour butter.

The carcase swells up quickly after death and blood sometimes trickles from the nostrils and anus.

Examination of the carcase in cases occurring in this State revealed, in addition to muscle lesions, pale-coloured mucous membranes, and discharge of blood from nostrils and anus. The lungs and pleura appear to be covered with blood-tinged exudate, and the heart muscle is greyish black due to exudation of blood, while there is usually endocarditis present. The spleen is normal in size ((different to anthrax and red water).

Treatment is not possible. Carcases and all contaminated fodder, etc., must be burnt. Stock should be removed from the paddock where mortality has occurred, preferably on to higher ground.

The spread of the disease may be prevented by inoculating all stock under two years of age with Blackleg Vaccine before placing them on infected paddocks. Vaccine may be obtained from wholesale druggists or from Commonwealth Serum Laboratories. Aggressin vaccine is safest as it does not contain any germs.

Paddocks in which deaths have occurred remain infected and are likely to be responsible for losses in the autumn if stock are not inoculated. These paddocks should be reserved for stock over two years old or put into cultivation for a few years.

Blackleg Vaccine is 100 per cent. effective in preventing infection.

BLOWFLY PARASITE.

THE RED-LEGGED CHALCID.

Stenosterys Fulvoventralis (Dodd).

Order *Hymenoptera*. Family *Encyritidae*. Genus *Stenosterys*.

By L. J. NEWMAN, F.E.S. Entomologist, and
H. G. ANDREWARTHA, B.Sc.Agr., Agricultural Adviser.

There are several species of blowflies in this State which cause considerable loss to our sheep farmers. Taking Australia as a whole, the loss of sheep runs into several millions annually. It is, unfortunately, the breeding ewes in the main that are attacked, and hence the natural increase is also retarded.

The effect upon sheep when badly struck by the blowfly almost beggars description, particularly when once the maggots get through the skin.

All growers who have seen sheep in this condition agree that there are few more pitiable sights in nature than a "maggoty" sheep.

To determine the actual species of flies responsible for this serious loss, a blowfly survey of the South-West is now being made.

A number of centres have been chosen, namely, the State Experimental farms at Chapman, Wongan Hills, Dampawah, Merredin, Avondale, Salmon Gums, and the Insectary grounds, Perth. Each farm was supplied with a West Australian blowfly trap, together with instructions how to bait and set up and how to forward the flies each month.

The findings of this survey will eventually be published in graph form, showing the relative abundance of each species of fly every month of the year.

There are many ways in which the ravages and consequent losses by these flies can be reduced. This need for action has resulted in much experimental work with the view of finding some artificial repellents, sprays and dipping mediums, that can be safely applied to the sheep. Many preparations, some effective, others useless, have been placed upon the market for spraying, jetting or dipping. Various types of traps have also been invented, some proving very useful.

A great check can be accomplished by practising farm sanitation, which means the destruction of all dead carcasses or other matter likely to be used as breeding mediums.

Unfortunately we have always to reckon with the careless and indifferent growers, who will not take the trouble to protect their sheep or to dispose of dead animals, hence in spite of all that has been done by other growers, the blowflies are still a very serious factor to the sheep farmer, and, indirectly, to the general community.

It is not intended in this article to expatiate upon artificial methods. With the desire to help overcome this great loss, the Entomological Branch has been intently studying and experimenting with some of the natural insect parasites of the blowflies. In this biological effort we have reared and distributed many hundreds of thousands of the chalcid wasp, known as

Mormoniella brevicornis. This wasp has a great weakness, in that it only attacks the pupae, which renders its powers of usefulness very limited. The bulk of the blowfly maggots bury themselves in the soil, or other suitable shelter, before pupating, and hence are immune from attack by this parasite. It of course exercises a certain amount of control and is therefore beneficial. There are a number of other minor parasites which have been noted during our work.

The introduced parasite (*Alysia manducator*) is being reared, and when in sufficient numbers will be liberated. The most encouraging of all the parasites we have handled to date is the Chalcid Wasp, *Stenosterys fulvoventralis,* commonly known as the Red-legged Chalcid. This tiny wasp was first found in our South Coast country. Since its discovery we have established it in several districts and have reared and distributed many thousands amongst the sheep flocks. It is easy to handle and readily attacks the larvae and pupae of all species of sheep blowflies other than *Ophyra nigra.*

This chalcid has been reported as occurring casually in Eastern Australia. Little effort appears to have been made to breed it up or to test its value. We venture the opinion that probably the local strain is more virile than the Eastern States form.

A strong colony has been supplied to the Federal Entomological Department, Canberra, for experimental purposes. Should our assumption that we have found a more virile strain of Stenosterys than has been previously handled in Australia be borne out, by experience in Canberra, this little wasp may prove to be of great value to the sheep industry of Australia.

Description.—Head, upper surface of thorax and under surface of abdomen, dull purplish black with metallic reflections brightest on the hind portion of the thorax, which exhibits a greenish sheen. Antennae dark chocolate brown, with the scape and first joint slightly lighter. The whole being thickly clothed with fine hairs. Legs under surface of abdomen reddish brown in live specimens, but when dead exhibit a faded dull yellowish brown. Legs clothed with dull yellowish hairs darkest at the tips of the tarsi or feet. Face, back of head and dorsal surface of thorax and sides of abdomen, bearing scattered, rather long, black hairs. The apex of the abdomen bears a tuft of long scattered rather coarse black hairs. Eyes large and almost black, occupying the main portion of front and sides of head. Wings transparent, fore pair longer than abdomen and covered with fine hairs. About one third from base of wing is to be seen a narrow V-shaped transverse clear space. The typical Chalcid stigma is to be observed. Hind wings finely crenulated and iridescent. (See Figures I. and II.)

This little wasp appears to lay from fifteen to twenty-five eggs in a single blowfly maggot or pupa. It prefers fully developed maggots, but if these are not available it will readily lay into partly grown maggots or even pupae. The eggs hatch into small, whitish, semi-transparent, legless maggots, which feed upon the material which would otherwise have gone towards the formation of a mature blowfly.

They commence operations on the fatty and non-vital parts of their host's body and only turn their attention to the brain and other vital organs when the other material has been all consumed. This always takes place after the blowfly maggot has pupated when it has no further

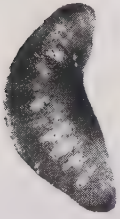
Fig. I.

× 12. (*Original.*)
Adult Female.

Fig. II.

× 12. (*Original.*)
Adult Male.

Fig. III.

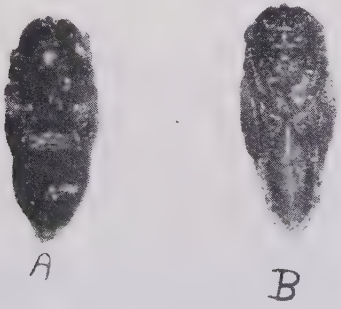


× 12. (*Original.*)
Fully grown Larva.

Fig. IV.

× 4. (*Original.*)
Pupa case of the hairy maggot (*Pycnosoma rufifacies*) with some of the wall removed to show the larval parasites within.

Fig. V.



Pupae of Parasite—A: dorsal view; B: ventral view.
× 12. (*Original.*)

need to use its nerve centres. A parasitised pupa may always be distinguished from a healthy one by the presence of these tiny wasp maggots in it when it is opened. The easiest way to do this is to prick open one end with a needle or pin, when anything from fifteen to twenty-five parasites will be readily seen within it, often so tightly packed together that it is hard to imagine how they manage to exist. (See Figure IV.)

After becoming fully fed, the larvae parasites pupate within the pupa of their host. At first they are whitish and semi-transparent, but as the time for them to issue draws near they change to a purplish black. (See Figure V.) One can be sure that a pupa case which, when opened, shows these small black wasp pupae, contains parasites which will be issuing within a few days. A pupa case from which has issued parasites may be recognised by the presence of one or more small circular holes in it which the parasites have cut to make an exit for themselves.

Our observations show us that, in the field, around Perth, where this little wasp has now become well established, it may be seen in large numbers on any exposed carcase from March to November inclusive. It can still be seen during the remaining months but its numbers suffer quite a serious reduction. In the insectary it is most active in the spring and autumn months, but it also does very good work through the height of the winter. Climatic conditions, particularly temperature and atmospheric sterility play an important part in regulating the speed with which this parasite can complete its life cycle. The third column in Table I. shows the number of days which elapsed between the date on which the first eggs were laid and the date on which the first parasite appeared. The periods are compared for various reasons through the year. It was observed that in any one batch the maximum issue of the parasite usually occurred two or three days after the first, and the last always appeared within ten days of the first.

Table I.

Eggs laid into Maggots on	First Parasites issued	Minimum Life Cycle of Parasite in Days.
12/4/29	25/5/29	43
16/4/29	4/6/29	49
18/4/29	7/6/29	50
28/5/29	7/8/29	70
10/6/29	21/8/29	72
18/6/29	29/8/29	70
19/8/29	11/10/29	53
27/8/29	14/10/29	48
10/10/29	18/11/29	39
28/10/29	27/11/29	30
29/11/29	29/12/29	30
31/12/29	29/1/30	29

An examination of this table shows that the parasites are slowest in their development in mid-winter when the life cycle may occupy slightly over ten weeks. As the summer approaches these periods become progressively shorter until in mid-summer the whole development from egg to adult is completed in 29 days.

In order to discover the relationship between the temperature and the time taken in development we kept records of the daily maxima and minima registered in the insectary. Table II. sets out these results: Columns (1) and (2) represent the average of the temperatures recorded during the period of days shown in column (4); column (4) represents the shortest time in days taken by the parasite to complete its life cycle at the temperatures shown in the first two columns.

Table II.

Mean of Daily Maxima in °F.	Mean of Daily Minima in °F.	Highest Temperature recorded.	Period of Development in Days.
71·9	53·1	82·0	52
79·1	59·4	84·0	39
88·9	63·1	98·0	30
91·1	65·5	105·0	29

From the above two tables it is apparent that quite a small change in the temperature of its surroundings has quite a big effect in speeding up or slowing down its development. The two extremes are ten weeks and four weeks. In the spring and autumn months when the parasites are really most active they require about 5 to 7 weeks to reach maturity. (See Table I.) Although higher temperatures result in a more rapid growth they nevertheless do not seem to agree so well with the parasite. High temperatures seem always to be associated with a lack of vitality and activity in the parasites. In the insectary this decline in virility appeared to set in when the average of the daily maxima readings reached about 88° F. It is evidenced by a general sluggishness on the part of the adults. They refuse to be strongly attracted to light and the females do not display much ardour in searching out and laying into the maggots. Further, during the hot sterile conditions which prevail around Perth in the mid-summer months of December and January, a large number of these wasps fail to cut a way out of the pupa case after reaching maturity. This may be due to two reasons. Firstly the wasp itself is weaker and less able to cut an exit hole for itself, and secondly the pupa case is probably much tougher than it would be under moister conditions. This trouble is most pronounced when the hairy maggot (*Pycnosoma rufifacies*) is the host. The parasites seem to be quite capable of laying into this maggot at any time, and in the spring and autumn months they have no difficulty in cutting a way out, but in the mid-summer months the mortality of fully developed parasites within this hairy pupa case is often very high indeed.

It would appear that in the field these factors are never sufficient to wipe out the parasite altogether. Although the carry over thread through these months may be slender, thanks to its very great fecundity its numbers increase rapidly so soon as weather conditions are suitable. This increase usually becomes apparent late in February and early in March. These facts, together with the tendency for this wasp to be most active when the flies are causing the most serious damage to sheep are a good augury for its success and usefulness. The ultimate test of these qualities will, of course, only have been made after it has been given every chance to establish itself thoroughly throughout our wool-growing districts.

In order to do this we are continuing our work of breeding these parasites and we hope to have further supplies for distribution in the autumn and spring of this year. Growers who are desirous of establishing this beneficial insect on their farms should apply to this Department for a colony.

The wasps are distributed while they are still within the blowfly pupa case. An effort is always made to judge the despatch of these packages so that the wasps will emerge a few days to a week after they arrive. But in order to be on the safe side it is wise to open the package in the field alongside a flyblown carcase. If this is done any parasites which have already issued will be sure to find their way directly to their hosts. After opening the box and removing the cotton wool packing, place it in a clear jar containing a little moist sand and covered with some cloth such as calico or muslin. The jar should be kept in a cool place and examined daily, and as the parasites emerge liberate them on a maggot-infested carcase.

An alternative method of establishing the wasps is to remove the parasitised blowfly pupae from the box and scatter them carefully in sheltered positions under the carcase. On no account should they be placed where they will be exposed to the sun, as it would mean certain death to the tiny wasps within them. This method has the disadvantage that some of the pupae may be destroyed by carnivorous beetles and other predators before the parasites emerge. It has the advantage, however, of being easier and involves less care and attention.

Once the parasites have been established in one part of a farm or district much good work can be done in spreading them if the farmer collect parasitised pupae from under a carcase and distribute them to other parts of the farm or to other farms in his district. Unless the parasites are very numerous any attempt to breed them for distribution on the farm might quite easily result in producing far more blowflies than parasites since there will probably be a large percentage of the former which will escape and pupate in the soil without ever having been parasitised. If the carcase used for this purpose is enclosed in a gauze frame or placed in a tin with a gauze cover, this will prevent the flies from escaping, but will permit the exit of the parasite.

The breeding and spreading of these parasites will be found to be exceedingly interesting and profitable.

CONCRETE ON THE FARM.

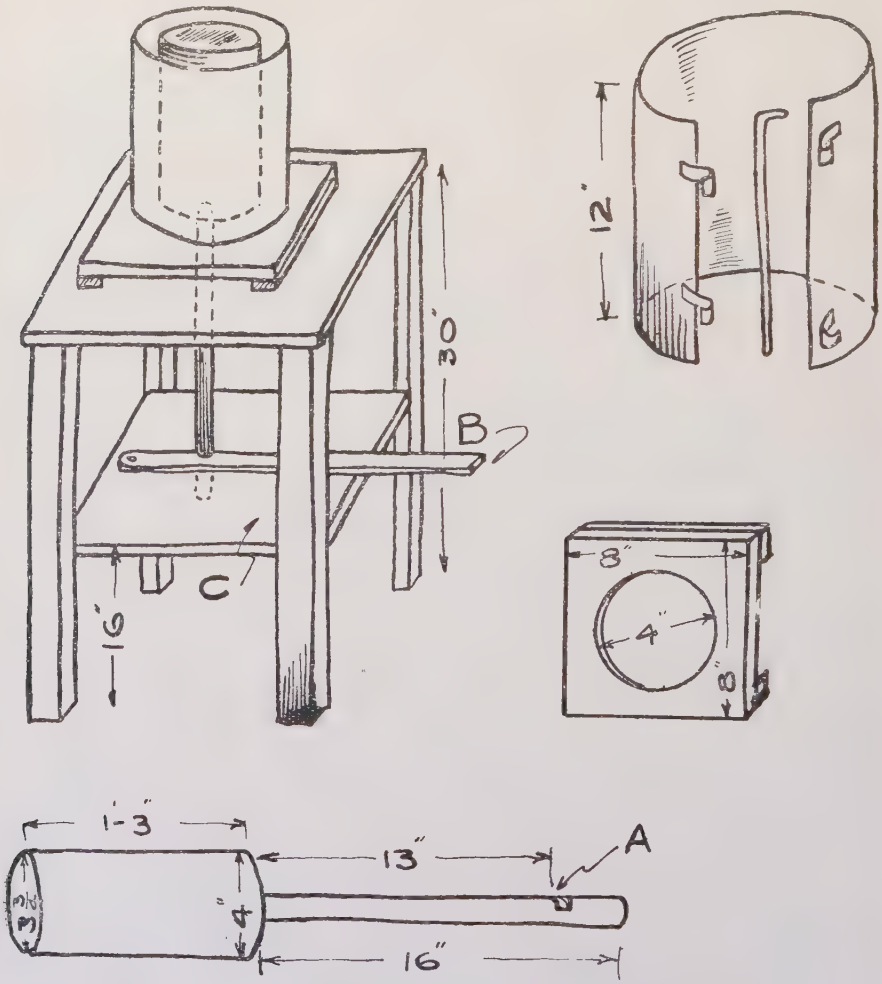
(Concluded.)

By Courtesy of the Swan Cement Company.

CONCRETE DRAIN PIPES.

A good mixture for concrete drain pipes consists of one part Portland cement, four parts coarse sand, and three parts of small gravel or stone. This will make a very porous pipe which is desirable. Using such a mixture as this one bag of cement will make approximately 50 pipes having an opening of 4 inches in diameter and an outside diameter of 6 inches by 12 inches long. A simple mould for making pipes is shown below. The table

Fig. I.



Pallet Boards and Moulds for Concrete Drain Pipes.

should be 16in. square by 30in. high with a 4in. hole in the centre for the core of the pipe to pass through. Fourteen inches below the top is a support for the lever which holds the core when raised. The lever is inserted in the notch "A" of the core. When raised, the bottom of the core cylinder is one inch below the top of the table, and the pallet board is placed over it. These pallet boards are eight inches square with a four-inch round opening in the centre, two cleats are provided to prevent warping. As the pipe must remain on these pallets until the cement has set, it is necessary to have as many pallet boards as pipes made per day, as the pipe should remain on them undisturbed for at least 24 hours. After the pallet is placed over the core, the shell is then placed around the core and on the pallet board. This shell can be made by any tinsmith, using a sheet of galvanised iron 12in. x 20in. Four curved hooks are riveted on as shown in detail. These hooks pass each other and the latch rod is placed in them. The concrete is tamped inside the shell round the core and so forms the pipe. To remove the pipe, first draw the lever "B" which releases the core; then tap the core on top and it will drop 13in. until its cylinder rests on lever "B." Next draw the latch rod out vertically, and the shell can be removed. The pallet and pipe can now be taken away and the operation repeated.

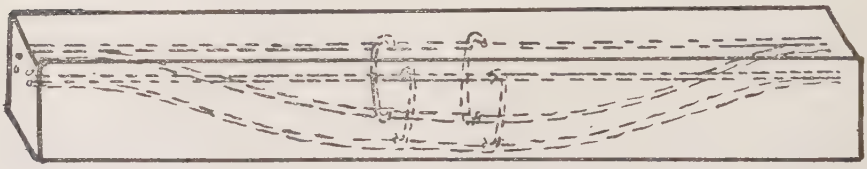
A suitable tamper can be made from a block of iron 2in. square and §in. thick. On one edge insert a half-inch diameter bar two feet long for a handle. The core, which is made of wood, is ¼in. less in diameter at the top than the bottom. This facilitates its easy removal from the pipe and prevents cracking same. The rod inserted into this core, may be of wood or iron; an old fork handle is quite suitable. The hole for the rod to pass through board "C" should be such that it cannot sway the core when it is lowered, as this is liable to break the pipe. The concrete used must be mixed with just sufficient water to enable packing, and after the pipes are several hours old they should be sprinkled with clean water every six to eight hours for several days. Pipes can be laid in the ground when but a few days old as the dampness in the soil should be sufficient to continue the hardening of the concrete. The parts of this mould should be coated with shellac before using, and the pallet boards should be kept from sunlight or well painted before using. The metal parts of the mould will readily free themselves from concrete if frequently oiled with harvester or common machine oil.

BEAMS.

The following is a simple method of calculation of small reinforced concrete beams and is culled from the pages of "Concrete for House, Farm, and Estate," a handy little publication by Fred Ballard:—

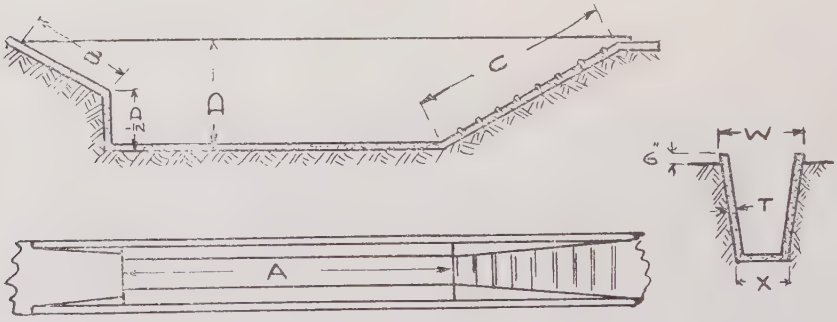
"In most building construction the question of beams is an important factor. A broad and safe formula for a reinforced beam is to calculate 1in. of depth for every foot run: thus, a beam of 12 feet span would be one foot deep, and the width should be at least half the depth. A greater width in beams is often better; a 9in. width works conveniently with brickwork. A 12 foot beam reinforced with four bars ½in. square, two bars placed within ¾in. of the bottom of the beam and 1in. from the outer edge, and two bars on top of the beam, with four pot hooks placed within one foot of the centre and connecting the bottom bars with the top ones, will suffice for any ordin-

ary building construction. Additional strength can undoubtedly be given by bending the bottom bars at a distance of one-third from the end of the beam and taking them up to the top edge, as shown in Fig. II.; the tensile and compressive forces are better met with in this manner. The beam must be securely propped during construction; no false work, but particularly strong and sound timbering is necessary. Any jarring or vibration should be avoided until the concrete is well set, and in no case should the props be removed in less than four weeks; and if longer time can be given, it is better."

Fig. II.

CONCRETE DIPPING TANKS.

The construction of a concrete dipping tank presents little difficulty to the man on the farm, once the sizes and quantities of material have been decided. The following table will be found helpful in this respect and the quantities given are based on the use of a 4-2-1 mix. Great care should be taken with the tamping in of the concrete if a good watertight job is to result.

Fig. III.



KIND	A	B	C	D	W	X	T	BAGS CEMENT	SAND	STONE
Horses	31-0	8-8	18-7	8-8	5-10	3-4	8"	114	11 Yds	22 Yds
Cattle	31-0	7-8	15-4	7-8	5-4	3-4	8"	108	10½ "	21 "
Sheep	31-0	5-8	11-6	5-8	3-4	2-4	8"	66	6½ "	13 "
Hogs	21-0	5-8	11-6	5-8	3-4	2-4	8"	57	5½ "	11 "

Dimensions and Quantities for Dipping Tanks.

UNDERGROUND TANKS.

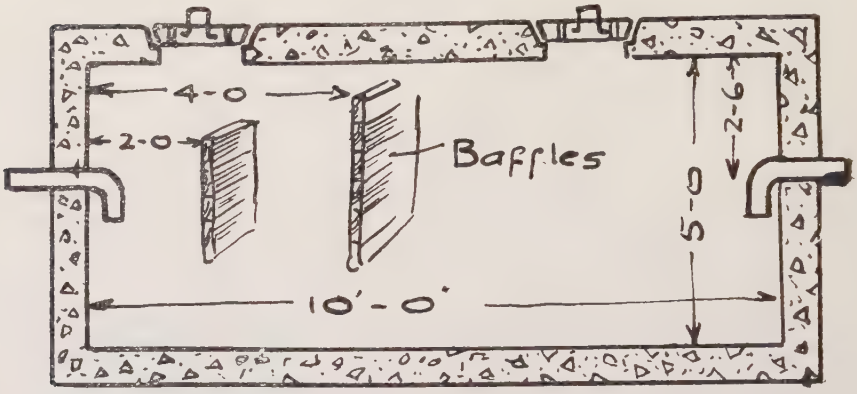
In the construction of underground concrete tanks the earthwork should be first of all got out with as little disturbance to the ground against which the walls are to rest as possible. A convenient depth is about eight feet. If the ground is solid and will stand up it will only be necessary to have wooden framing on the inside. This should be set to the required sizes and strutted across by timbers to prevent bulging when the concrete is being tamped in. The floor should be 5in. thick reinforced with ⅜in round bars at 18in. centres both ways (at right angles). The bars should be tied together at the crossings with wire, making a sort of large mesh netting. This reinforcement should be placed ½in. from the top of the floor and also a similar reinforcement about 1in. from the bottom. While the concrete is being put into place this iron can be held in position by lumps of stone placed in between the mesh as the work proceeds. The walls should be 6in. thick, and reinforced every 9in. in the centre of the wall with a vertical bar ⅜in. diameter, and at every 18in. rise on these vertical bars a horizontal bar or strong wire should be placed. The top of the wall should be about a foot above ground level, and if a roof is to be put on it will be as well to set a few bolts in the top of the wall at intervals, so that the timber work of the roof can be bolted down tightly. A point to remember is that if the bottom of the tank is put in one day and the walls a day or so afterwards it is necessary to stud the bottom round with pieces of iron of the same size as used in reinforcing the walls, putting them well into the concrete in the wall line, and allowing them to stand up six to nine inches above the bottom; the vertical bars then come down against them, forming a tie equivalent to a continuous bar of iron. Short studs are better than long bars, the latter being easily knocked out of position and the cement joint between iron and concrete broken. In constructing tanks it is advisable to use a fairly small size stone, say about ¾in. to 1in. diameter, and to tamp all concrete well so that a good solid concrete is obtained. The above details are for comparatively small tanks, very large tanks will entail greater strength and may need the guidance of a special enginer.

SEPTIC TANKS.

Septic tanks are nothing but long underground water-tight cisterns through which the sewage passes very slowly and evenly—located underground, they are warm and dark—ideal conditions for the development of the bacteria, little germs which eat up the sewage and render it harmless in much the same way as another kind causes cider to ferment. To prevent the bacteria (which live in the frothy sludge) from being disturbed cross walls, called baffle boards, are placed to break up the current from the incoming sewage. The purified sewage, merely clean water, may be discharged into the farm drain pipe. Locate the septic tank where it can be placed entirely with the side walls underground and out of danger of flood waters. For a family of eight or ten, construct a tank with eight inch walls, five feet deep by five feet wide by 10 feet long—all dimensions inside. Before filling the forms with concrete (4:2:1 mix) set in the six-inch inlet and outlet drains at the same height, two feet six inches below ground level. To aid further in breaking up the currents and keeping out too much air, use elbow bends, so that the sewage in the tank will cover the mouth of the drain. In the side

forms, at a distance of two and four feet from the inlet wall, set ¾in. bolts to which the baffle boards will later be attached. These boards reach entirely across the tank, project above the sewage, and extend to within one foot of the bottom. While building the manhole covers for the needed ventilation insert in them four short lengths of 1in. gas pipe, also a piece of bent iron to form a lifting handle. A tank built to the above dimensions would take approximately 27 bags of cement to construct—using a 4:2:1 mixture.

Fig. IV.



SEPTIC TANK

CEMENTING GALVANISED IRON TANK.

It is usual to do this work from the inside only, as it makes a much stronger job, and the tank retains its original appearance outside. All dust and dirt must be scrubbed off the sides, and the bottom cleaned out. A solid stand is essential, of brick, concrete or masonry, because once cemented a tank becomes too heavy to move, and timber, even jarrah, will eventually rot.

The bottom of the tank must be well bedded and filled with three inches of 4:2:1 cement concrete, well spaded into the tank corners. Before this is put in, the outlet must be extended upwards so that the draw off is still about three inches above the new level. Also, the first rings of wire netting must be placed so that it will lock into the bottom concrete. Reinforcement in the bottom is not necessary, but makes a safer job. Expanded metal or a good stout wire netting are both suitable.

The wire netting may be expanded inside the tank and pressed up against the sides so tightly that it will remain there of its own accord, there being no need to punch holes to hold it. The rendering up is then done with a 1 : 3 cement mortar, with, for preference, about 5 per cent. of hydrated lime to assist in the waterproofing. The coat should be thrown on rather than trowelled, and the rough surface so obtained will give an excellent coat for the final rendering, which should not be much more than a quarter inch thick.

For this work a well-graded sand, free from very coarse particles, must be used. The last coat must be trowelled hard, but must not be excessively wet, otherwise surface cracks will be formed by the flushing out of the cement and subsequent shrinkage.

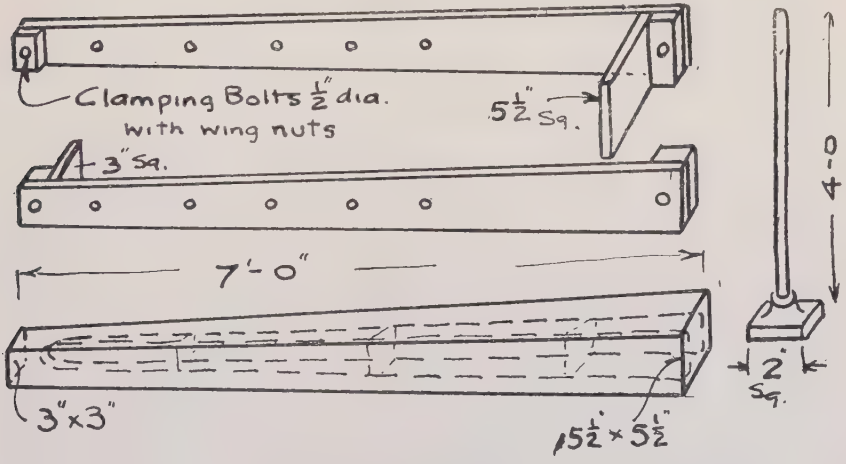
A good round between the sides and the bottom is essential. The last job of all is rendering the bottom, a full half inch in thickness, taking especial care with the joint between the sides and the bottom.

The worst job of all will be getting out of the tank at the finish without damaging the sides or the bottom, and the only way of doing this satisfactorily is to sling a beam across the manhole above the tank and crawl up a rope ladder. The final touches to the bottom may be given first standing on a board and then swinging from the ladder itself.

CONCRETE FENCE POSTS.

Fence posts should be constructed with a mixture of one part cement, two parts sand, and three parts of small stone, say about ½in. to ¾in. diameter. A simple form for making posts is shown below, the dimensions, however, can be altered to suit individual requirements. The post shown contains one cubic foot of solid concrete, and using the above mixture about

Fig. V.



Concrete Fence Posts.

4½ posts can be made from a bag of cement. Reinforcement should consist of two wires or rods ¼in. diameter bent hairpin shape, the end should be bent over and the rods wired together at two or three points along. The posts should be made on a solid floor, a concrete floor is the best. This floor should be sprinkled with dry sand and the mould placed and filled. The mould is then removed, as the post must remain undisturbed for at least two days. The concrete is stamped into the form with a tamper similar to that depicted below. If small holes are required to take wire through the post, steel or iron rods are passed through the wood sides in the holes provided so that they will be embedded in the post. These rods are pulled out when

stripping the mould off. If wire netting is to be hung on the posts, galvanised iron wire is embedded in the concrete so that about one inch projects from the side of the post. This projecting end is twisted round the netting when it is placed in position.

A FOOTPATH FOR LIGHT TRAFFIC.

First of all set out the position of the footpath, by means of wooden battens as shown above, and level off the ground on which the path is to be laid. Next procure some old bricks and break them up into pieces about two inches in diameter and pack them tightly in between the wooden battens, so forming a solid foundation for the path. Tamp the bricks down as evenly as possible and then saturate with water. The foundation is then ready to receive the cement mortar which should consist of two parts of clean sand (free from roots, etc.) to one part of cement. The cement and sand should be well mixed in a dry state and then the clean water added and again mixed until the mixture becomes plastic enough to work. Place the mortar right on to the wetted bricks and trowel off level with the top of the battens. Allow to set for a few hours and then cover with wet bags and keep damp for a day or two. On no account allow the water to dry out of the path too quickly, otherwise it will show a tendency to crumble and powder when put into use. If it is desired to colour the path, say red, it will be necessary to obtain some red oxide—this is worked into the surface of the path with a steel float—the quantity required depends to a great extent upon the density of the colour required, and the quality of the oxide, and is best found by experiment. Generally about 1 lb. will cover about 90 square feet.

One bag of cement (125 lbs.) will make enough mortar to cover approximately 15 square feet, consequently a path three feet wide would take one bag of cement for every five feet run.

GENERAL.

There seems to be an idea prevalent in many people's minds that there is some latent difficulty in making concrete. It is certain that some concrete is better than others; but the general concensus of opinion among those who have had most experience of working with concrete, and other means of building—wood, brick, galvanised iron, wattle and dab and pisé—is that concrete, either built solid or in situ, or with hollow blocks, presents no difficulties, and is as simple as it looks. With only ordinary care in keeping the cement dry up to the time it is used, obtaining clean, sharp sand and good gravel or broken stone, a creditable permanent structure can be built without any previous experience of masonry or bricklaying. This fact alone should commend it to the careful attention of those about to build.

COLOURING CEMENT.

The following proportions will form a useful guide for those who are desirous of having a coloured finish to their concrete:—

Red.

86 parts Portland cement.
14 parts red oxide of iron.

Yellow.

88 parts Portland cement.
12 parts yellow ochre.

Blue.

86 parts Portland cement.
14 parts azure blue or ultramarine.

Green.

90 parts Portland cement.
10 parts oxide of chromium.

Chocolate.

88 parts Portland cement.
6 parts black oxide of manganese.
4 parts black oxide of iron.
2 parts black oxide of iron or copper.

Black.

90 parts Portland cement.
10 parts black oxide of manganese or any carbon black.

Pink.

97 parts Portland cement.
3 parts best quality crimson lake.

USEFUL INFORMATION.

1 ton of cement is contained in 18 bags of Swan cement.
Each bag contains approximately 125 lbs., equal to 1 1/3rd cubic feet.
Three bags are equal to 1 cask of cement.
1 ton of sand equals 22 cubic feet.
1 gallon of water weighs 10 lbs.
1 cubic foot of water weighs 62½ lbs.
1 bag of cement mixed as neat cement mortar will cover 14 square feet 1 inch thick.
1 bag of cement mixed with 1 of sand will cover 22 square feet 1 inch thick.
1 bag of cement mixed with 2 of sand will cover 33 square feet 1 inch thick.
1 bag of cement mixed with 3 of sand will cover 45 square feet 1 inch thick.

Floors.

1 bag of cement mixed 4:2:1 will cover the following areas:—

4in. thick	2.1 sq. yds.
5in. thick	1.7 sq. yds.
6in. thick	1.4 sq. yds.
7in. thick	1.2 sq. yds.

Mass Concrete.

1 bag of cement will make the following quantity of concrete:—

Mixed 4 stone 2 sand 1 cement	5.4 cubic feet.
Mixed 5 stone 2½ sand 1 cement ..	6.7 cubic feet.
Mixed 6 stone 3 sand 1 cement	7.7 cubic feet.

To make 1 cubic yard of concrete 4:2:1 mix requires 4½ bags of cement.

THE BLUE PIMPERNEL.

(*Anagallis femina*, Mill.)

C. A. Gardner,
Government Botanist.

There are two Pimpernels in Western Australia both of which have been introduced from Europe—the Scarlet and the Blue. The Blue Pimpernel, however, is much the more prevalent species of the two, and may be found occurring almost everywhere where settlement has penetrated in this State. It is a small trailing or ascending weed favouring damp situations such as depressions or creeks moist in winter, and in such places it may be found flowering between the months of June and October, although in inland localities it may appear and flower after summer rains, or in shady spots its flowering season may continue until November. As a rule it dies down with the approach of summer dryness. This pretty annual has been accused of being poisonous, and there appears to be little doubt that such is the case. All reports, however, deal with *Anagallis arvensis*, the "Scarlet Pimpernel," but until recent years the blue and red pimpernels were treated as varieties or forms of the one plant, and many botanists still hold this view. The differences between the two are very slight, and it appears reasonable to suppose that if the red pimpernel is toxic, the blue is also toxic.

H. C. Long, "Plants Poisonous to Live Stock" (1924), states that if eaten in sufficient quantity, Pimpernel has a poisonous action, having an irritant action on the digestive tract—the intestines—as well as producing narcotic effects. Bailey says "a dog is stated to have been destroyed by making it swallow three drachms of the extract of the plant," while another author states that the fluid extract in four drachm doses is fatal to dogs (the size of the dogs not being mentioned). In Lyons at the Veterinary School, horses were intentionally killed by administering a decoction of the plant. Ewart (Victoria) says that "it has been reported to render the chaff from oat crops infested by the weed unpalatable to stock," and Professor Gilruth states that about 1911 it was responsible for the death of a large number of sheep in Victoria, apparently acting as a narcotic poison. On the Pacific coast the plant is known as "Poison Weed," and Grognier and Orfila are stated to have put its poisonous properties beyond doubt.

It would appear from the above that the Scarlet Pimpernel is therefore undoubtedly poisonous, and this being the case, there is reason to suspect the Blue Pimpernel also. At the same time we know of no authentic cases of poisoning from either plant in Western Australia. The plant is not readily eaten by stock, especially when other feed is available, and for this reason no cases of poisoning in this country have come under our notice. It grows at the time of the year when feed is usually prevalent, but if the plants should be found growing in abundance in isolated damp spots during summer when feed is scarce, there may be some real danger from stock eating this plant, in searching for green mouthsful. The exact position concerning Blue Pimpernel is most unsatisfactory because of the confusion which has existed between the two plants, but the weed is so common in our agricultural districts in the spring, with only few cases arousing suspicion, that the effects from eating it, if any, do not warrant any action being taken beyond

the ordinary methods adopted for weed control. On the other hand where the weed is found in summer, there may be a source of danger, especially with the Scarlet Pimpernel, and eradication may be advisable.

Explanation of Plate.

A, plant, showing habit of growth (half natural size). B, flower (about natural size). C, details of ovary style and stamens (enlarged). D, fruit (slightly enlarged). E, fruit opening, showing the falling cap and the arrangement of seeds.

Both plants are annual, and may be controlled by preventing the possibility of seeding. Frequent cultivation and harrowing, and clean fallows will do much to cope with the weed where it occurs abundantly.

Description of the Plant.—A procumbent or ascending much-branched glabrous annual, 6 to above 12 inches high. Leaves opposite, sessile, broadly ovate, obtuse, usually ¼ to ½ inch long. Flowers blue on slender axillary pedicels, longer than the leaves, recurving as the fruit ripens. Calyx 5-cleft, corolla rotate, deeply 5-lobed. Stamens 5, the filaments woolly-hairy, anthers with parallel cells. Fruit a pyxidium—*i.e.*, a capsule opening transversely—with a globular placenta and numerous seeds.

Original home Europe. Common in shady spots on the western coastal plain, extending eastwards to the Goldfields, usually in depressions.

HORTICULTURAL NOTES.

Geo. W. Wickens,
Superintendent of Horticulture.

STONE FRUITS.

When this issue reaches the growers summer will have waned, and autumn tints be showing on trees and vines of varieties maturing their fruit in the earlier part of the season. The talk of the glut of stone fruit will have subsided and thoughts of it live mainly in the minds of those whose income was much below expectations owing to a large portion of the crop being either unsaleable or saleable only at prices that barely covered the cost of cases and the seller's commission. If it were Nature's plan to produce excessive crops in successive seasons, her lessons would be more readily learned, and not easily forgotten, but with very light crops usually following very heavy crops, the experience of the too-bountiful season is forgotten in the lean season, and so the mistake of allowing the trees to again overproduce is perpetuated.

Unless something in the nature of a miracle occurs, the stone fruit crop in season 1930-31 will be a very meagre one indeed. Not only did the trees suffer from over-cropping in the present season, but continued dry weather in summer, following a winter with a rainfall below the average, has also had its effect in limiting growth and preventing fruit buds from developing. In addition, the limbs of many old trees have broken down badly under the weight of fruit, and these combined circumstances make it certain that the major portion of next season's stone fruit crop must be looked for on younger trees, just reaching bearing age. So it will happen that many growers will add to the losses sustained in the year when prices were low, the lack of receipts in the following year when prices are high, but fruit absent. To fail to derive income from an orchard both in the heavy and light years is a disastrous state of affairs, and can be guarded against by

preventing the trees from over-cropping. This is done by keeping the trees in good heart with manure and cultivation, reducing the fruiting wood by judicious pruning, and heavily thinning the young fruits; not only will this treatment prevent over-cropping in the abundant season, but will also materially assist in the production of fruit in the light season.

Before leaving this subject I would like to state there was no glut of really prime fruit this season; prime fruit did not bring at times the price it should, but there was always a sale for it, and the low price was due to the bearing down effect caused by the quantities of rubbish on offer at the same time. "Keep the rubbish off the market" is a good slogan, but "Avoid producing rubbish" is a better one. No grower can be certain that he can make his trees (particularly stone fruit trees) produce a crop in a given season, for after the utmost care bad weather conditions or disease might nullify his efforts, but every intelligent orchardist can and should prevent his trees from over-cropping.

APPLES.

Great is the change this season from the fruit shipping activities of last. During the twelve months ending 30th June, 1929, 737,676 cases of fruit were shipped from Western Australia to overseas markets, and in the same period 166,032 cases were shipped to the Eastern States, making a total export for the year of 903,708 cases. This year shipping space booked for overseas markets is under 170,000 cases, and it is most unlikely that any fruit will be sent to the Eastern States.

The great falling off in export is due to the light crop of apples, which will probably amount to little more than one-third of last season's production, and what this means in the export trade is shown by the fact that of the 903,708 cases mentioned above as having been sent out of Western Australia, 821,014, or over 90 per cent. of the total, consisted of apples.

Just as the stone fruit growers in season 1929-30 had an over-crop with a large proportion of it undersized, so may the apple growers in season 1930-31 have a similar experience unless they take the necessary steps to prevent it, by pruning severely, manuring heavily, cultivating thoroughly, and thinning drastically.

ORANGES.

The orange crop this year, that is the crop which will commence ripening from the latter part of May onwards, promises to be well in advance of last year's yield. The average production for the last five years for which figures are available amounts to 206,674 cases per annum, and at time of writing—February—it looks as though this year's crop will exceed that by about 20 per cent., but the very dry weather now being experienced, and last winter's rainfall being under the average, renders a crop estimate at the present time a dubious matter, for in some orangeries which have not facilities for irrigation, a number of trees are drought stricken, and unless rain falls in the near future will fail to mature their fruit. I have visited many citrus orchards within the last few weeks for the purpose of forming an estimate of the coming crop, and have noticed in several places where irrigation was being practised that the first watering had been too long delayed, the trees having been allowed to partially wilt before moisture was supplied to the soil, and the effect of this has been, what is common under such circumstances, an out-of-season blooming which, whether it produces fruit or not, is bad for the trees and unprofitable to the grower.

In a few weeks' time from date of writing it will be possible to judge fairly accurately if my estimate of a 20 per cent. increase, which means a crop of about 250,000 cases, will be approximately correct or otherwise, and if my expectations are realised it will be the heaviest yield, bar one, since the industry started in Western Australia. The exception referred to was in season 1923-24, when the record for the State was established with 264,160 cases; 1924 was also the peak year for area, which then amounted to 3,251 acres, a total that has since steadily declined until it now stands at 2,931 acres. I am satisfied this decline has not been brought about through a difficulty in obtaining a payable price for the product, because during the last five years good oranges have sold well in Western Australia despite the fact that the quantity exported decreased during that period. No! a tour through the orange growing districts will soon convince any one that the lessening area is due to trees having been planted in unsuitable situations, and later taken out to make room for something more profitable under the existing conditions. Sometimes the soil has been the trouble, at others there has been too much water, and again too little, but whatever the cause the rooting out is a warning to property holders in those localities not to tread in the same path, and so new plantations do not take the place of the demolished ones.

As a matter of fact while there are thousands of acres in Western Australia which are eminently suitable for growing apple, pear, stone fruit trees and grape vines, it is not easy to find a large area of land suitable for orange growing. The difficulty arises because the land must not be situated in the colder parts of the South and South-West, where the rainfall is ample, because climatic conditions are there unsuitable, and further North, where climate and soil are right, lack of water is mostly the limiting factor.

For this reason, with a steadily increasing population there seems to be little fear of over-production, and where soil is suitable, the climate right, and sufficient rainfall or water for irrigation available, orange planting is still a sound proposition.

I noticed last winter that a number of orange growers had failed to apply Bordeaux Mixture—4:4:50—or Burgundy—4:6:50—in time to prevent Citrus Brown Rot from appearing and damaging the trees, and I take this opportunity of advising that the spraying should be carried out before the end of April.

THE EFFECT OF SUPERPHOSPHATE ON SUBTERRANEAN CLOVER SEED.

A. B. ADAMS, B.Sc. Agr.

It is generally known that superphosphate has an injurious effect on some seeds, particularly when the seeds are in contact with it for a lengthy period.* There is, however, but little definite information available showing the effect of superphosphate on Subterranean Clover seed.

The popular ideas on the subject are hazy, some think much injury is caused, while others are of opinion that the acid of the superphosphate has some beneficial effect by softening the hard-shelled seeds.

* Jour. of Agric., W.A., Sept., 1926, "The Sowing of Small Seeds," G. K. Baron-Hay.

The experiments described below were carried out with the object of throwing some light on the subject.

The seed used was clean seed, of the first early variety of Subterranean Clover. Both old and new season's superphosphate was used, but keeping the superphosphate for a period had no appreciable effect on the result.

The method of testing followed was to mix a quantity of seed with superphosphate, and at various subsequent periods to remove a number of seeds and compare their germination with the germination of an equal number of seeds that had not been in contact with the fertiliser.

In the first experiment the seeds were mixed with superphosphate for nine days, and were then tested for germination with the following result:—

Untreated—41 per cent. germinated.
Treated—31 per cent. germinated.

The experiment was repeated a number of times, leaving the seed in the superphosphate for longer and shorter periods. Lengthening the period did not materially decrease the percentage, but shortening the time to 24 hours raised the percentage of germinating seeds to the level of those untreated. Although the percentage was the same there was a slight delay in the time, showing that the fertiliser was commencing to take effect on the seed. As a short exposure causes a drop in the percentage of germination, and a very long exposure has little further effect, it would make one surmise that the seeds vary in degree of susceptibility. This was found to be the case.

On washing the seeds and examining them carefully, a difference in the colour of the seed coat was noted; the majority of the seeds were a purplish black, but about ten per cent. were of a dark red appearance.

On separating the colours and testing them separately, it was found that the red seeds germinated more quickly when untreated, but were easily injured by the fertiliser, and if left in contact with it for more than 24 hours their germination was seriously delayed, even if the embryo was not killed. The seat of the injury is the radicle, as some of the red seeds left in superphosphate for 48 hours germinated after 14 days (the normal time is two to four days), but the germination was not normal as the seed leaves developed without the corresponding growth of the root system. In normal growth the radicle is the first part to appear.

The purple-black seeds did not suffer even when left in the superphosphate for many weeks.

The seeds which did not germinate at all were mostly purple-black seeds of a smaller size, and were presumably hard shelled, as they were quite unaffected when left in damp blotting paper for long periods.

Summary.—The effect of mixing Subterranean Clover seed with superphosphate before sowing will vary with the sample. Some seeds are easily damaged, while others are very resistant. In practice, therefore, one will avoid risk of damage by mixing the seed and fertiliser immediately before sowing. Should, however, too much have been mixed, or if sowing is delayed from any cause, it does not follow that all the seed will have been injured, but there will probably be some decrease in the percentage of germination.

NOTES ON CULTIVATION OF THE TANGIER PEA.

G. K. BARON-HAY,
Superintendent of Dairying.

During the last three seasons a considerable number of farmers have grown the Tangier Pea under field conditions, with varying success. The special qualities of the Tangier Pea, namely, heavy growth and drought resistance, have made it a plant worthy of renewed trials.

A careful perusal of the results obtained from a large number of trials show that, where cultural conditions have been reasonable, in almost every instance the plants in a failure exhibit similar characteristics. These features are very stunted growth, failure to stool, and a pink to red colour of the leaves and stems. The writer has seen plants only 9 inches high and six months old, while other plants in the same field and planted the same day are seven or eight feet high.

Mr. A. T. O'Connell, who has grown a successful crop of the Tangier Pea under field conditions for three years in succession, noticed certain areas this season in his 20 acre paddock of crop which showed the above symptoms, and was able to remedy the trouble.

Portion of 20 acres of Tangier Peas grown by Mr. A. T. O'Connell, "Waitemata," Dwarda, 23rd November, 1929.
(*Photo. by "Elder's Weekly."*)

The Tangier Pea, in common with other legumes, cannot thrive without the assistance of nitrogenous fertilisers, unless certain soil bacteria are found in association with it, and growing in colonies or nodules on its root. Those growing on the Tangier Pea are very large and numerous.

The condition described above is that expected where the crop is suffering from the lack of these bacteria. This is verified by the fact that, where farmyard manure or nitrogenous fertilisers were applied in the trials, good growths were obtained.

The bacteria affecting the roots of various species of legumes may be divided into groups, and bacteria from one group are not interchangeable with those in another. Eleven groups have thus been isolated, the bacteria

affecting the roots of the Tangier Pea being also common to the Garden Pea and Field Pea (Pisum sativum), Hairy Vetch (Vicia villosa), Broad Bean (Vicia faba), Lentil (Ervum lens), and the Sweet Pea (Lathyrus odoratus). These plants are not yet commonly grown on farms, especially in the South-West Dairy Belt, and quite probably absence of these bacteria has been a limiting factor for growth.

Tangier Peas.

Demonstration showing effects of want of inoculation. Ladies standing on the uninoculated patch. Hat can be seen on gentleman standing in peas to the left of photo. (Photo. taken 29/11/29.)

Mr. A. T. O'Connell, at Dwarda, acting on the above assumption, by inoculating the sickly portions of his crop, was able to cure the trouble, and treated plants overtook healthy ones in their growth.

Inoculation may be carried out by two methods:—

(a) By treatment of the seed prior to planting.

(b) By adding the necessary bacteria to the soil.

(a) For this method it is necessary to have an infusion either made from the nodules of healthy plants by crushing the nodules in water, or by having a culture of the bacteria available to be mixed with water or skim milk, and sprinkled on to the seed. By this method care must be taken not to expose the seed to direct sunlight before planting, and not to mix the seed with a fertiliser at sowing time.

(b) Probably the simplest method is to select soil from an area which has successfully grown any one of the following crops, and spread it on the area to be planted, at the rate of 1 cwt. per acre:—

1. Garden Pea.
2. Field Pea.
3. Vetches of any kind.
4. Broad Bean.
5. Lentil.
6. Sweet Pea.

BEE-KEEPING NOTES.

By H. WILLOUGHBY LANCE,
Science Apiculturist.

THE IMPORTANCE OF GOOD STOCK.

In all primary industries the importance of not only having the best breeds of either seed or livestock, but also of having the breed most suitable to the conditions of the district, has never been so fully realised as at the present time.

In view of this generally acknowledged fact of the importance of good blood, it is surprising to find a large number of bee-keepers who appear to be indifferent to it. In going about the country, one finds very few men who have a really first class bee; they may have a few good colonies, but they do not breed from these, nor do they purchase new pure bred queens. They let nature have its way, allowing the bees to swarm and to re-queen themselves. This method in bee-keeping, as with poultry or any other live stock, tends to the deterioration of the stock.

Selection and breeding from selection is the only way to get the best results, reduce production costs, and enable the farmer, be he bee-farmer or other, to meet competition and earn a comfortable living.

Of course this is not the only factor upon which success depends. The general method of conducting the work of the farm is most important, and then there are so many factors over which the farmer has no control, such as the weather, forest fires, etc. This, however, is a certain fact, that in a good season, with a good honey flow, any colony of bees that is fairly strong, will probably do well, even if badly neglected by the owner. But when circumstances are against the industrious bee everything depends upon the strains from which the bees have been bred. Bees from a good stock will survive and perhaps store a surplus, while the indifferent ones will go under. Practically all successful bee-keepers are careful to re-queen every colony at least every two years, and some every year, or even less if the queen does not deliver the goods.

Some of them breed their own queens from their best colonies, others consider that it pays them better to concentrate on honey production and leave the queen breeding to the expert.

The Department, recognising the importance of good stock, has imported Italian queens from Italy, and Carniolans from Jugo-Slavia. Queen rearing has been carried on on a small scale this season and a few good Italian queens are available at standard prices, and anyone requiring these should apply to the Government Apiculturist without delay. Carniolans are

not available at present, as these are required for re-queening our own colonies, it being intended to concentrate on the production of this race of bees next season.

Italian queens can always be obtained from reliable breeders, but pure bred Carniolans are very difficult to obtain. It is, therefore, felt to be best in the interests of bee-keepers to leave the breeding of Italians to those who have been successful up to the present, and concentrate on the new race which is rapidly growing in favour.

It is claimed for the Carniolan that they are a longer lived bee than the Italian, that they are hardier and will work in weather that keeps the Italian at home. That they build beautiful white comb and are quiet to handle.

A portion of Rottnest Queen-mating Apiary.

A longer lived bee means a smaller proportion of brood to that of adult bees than would be the case with a short-lived bee. That, again, means less food to be consumed by the nurse bees to make the chyle food for the larvæ. It is usually considered that the life of the average worker bee during the season is about six weeks; assuming that we can obtain workers that will live eight weeks instead of six, we should save 25 per cent. of the food required for raising brood. For instance, assume that we have a hive of 30,000 bees, with our average bee this would require the hatching of 5,000 bees per week to keep up the population of the hive, or 120,000 bees in six months. With a bee living eight weeks, only 3,750 bees would require to be

hatched per week or 90,000 bees in six months, instead of 120,000. We thus realise what an immense saving there would be in food.

As regards hardiness: a beekeeper in the South-West district, that has tried some Carniolans, tells me that they worked on the Karri during the winter, while the Italians did practically nothing.

For quietness and ease of handling, our own short experience shows them to be much in advance of Italians.

The importation of queens from Europe is a difficult matter. Of four Carniolans arriving by post, none arrived alive. Mr. Pender on his return from Europe brought with him in his cabin two Carniolans, as well as a number of Italians. Of these Carniolans, only one arrived alive, and we were fortunate in securing this one. We have also received two pure Carniolans from J. D. Morgan & Son, Rushworth.

Rottnest Island has been declared a sanctuary for Carniolan bees, and the Department has established a small apiary there for mating purposes. The young queens are reared on the mainland and taken over to Rottnest in Neucleus hives for mating. Only a few have been reared so far; these will be carefully watched during the coming months, and the best used for breeding purposes next spring.

There are no Eucalyptus on the Island, but there are plenty of spring flowers—wattle, templetonia, etc., which give the bees an early start; later in the season there is the tea-tree. There are periods when there is a dearth of nectar, but the bees appear to be able to gather enough to keep them through the season. One of the difficulties of the Island is the transport question, especially during the winter and spring, but it is hoped that this will improve in the future.

Queen rearing is not as easy as some may think. There are so many factors to contend with, any of which may cause the loss of queen cells or young queens. Sometimes one may get 80 or 90 per cent. of the cells put down accepted, the queens brought to maturity, mated and laying. At other times, owing to weather conditions, cessation of honey flow, overlooking a queen cell, leaving cells too long in the completing hive, or other factors, one may only be successful in getting 25 or 30 per cent.

There are several useful books on queen rearing and anyone wishing to try his hand is recommended to obtain "Australasian Queen Rearing," by W. S. Pender.

THE RED-LEGGED EARTH MITE.

(Penthaleus destructor.)

L. J. Newman, F.E.S.,
Entomologist.

The dry summer period is now nearing the end and we shall soon be entering the wet season. The advent of the rains unfortunately brings about a recrudescence of this serious pasture pest. From the time the rains ceased in November last to date of writing, we have seen little of this mite, nor have complaints been received as to its ravages. Upon the advent of the dry weather the mites deposit amongst litter and rubbish large numbers of aestivating or over-summering eggs. These withstand all the heat and dessiccation of the summer, hatching as soon as the atmosphere reaches a certain degree of saturation and the earth becomes well soaked. It is unfortunate that the same rains which cause the clover seed to germinate, also bring forth the mite. Most farmers, like other men, are inclined to take the line of least resistance, hence little attention is given to the initial outbreak of the pest in the autumn.

It is not until mid-June or later, that growers awaken to the fact that this pest is causing serious damage.

By this time the normal winter generations have appeared, from eggs laid upon the foliage, by the first brood mites, which issued from the over-summering eggs in the autumn. Very serious injury is done to the young clovers and other plants. This is caused by the numerous mites, which rasp the foliage and suck out the green chlorophyll matter from the young cotyleden or first leaves, put forth by the seeds. This results in the death of many seedlings, and where not actually killing, it seriously retards growth. Clovers are largely grown for early feed and any pest which prevents this causes great hardship to the animals, with consequent economic loss. As the season advances, the surviving plants will make good growth and outstrip the mites, finally yielding a profitable crop. The loss of winter feed and the reduction of crop yield are very important factors which have to be faced.

The difficulties with regard to the measures for the control of this pest are numerous. Firstly, it has so many host plants, such as legumes, potatoes, lettuce and many other vegetables and garden plants. Wheat, fortunately, has not yet been found to suffer seriously, but oats are more subject to damaging attack. Cape weed, chick weed and other succulent weeds which grow almost on any land or road side that has been cleared, carry this mite. In the pastures the subterranean clover appears to be the favourite food.

The earth mite does not climb fruit trees or other plants which grow to any height, being confined to low-growing vegetation. It has been confused with the Bryobia Mite, which is found upon fruit trees. In any method of control adopted, it is most essential that action be taken before the winter eggs have been produced. They are normally not found until three weeks to a month after the mites have appeared in the autumn. The eggs are most

resistant to any known treatment, and the fact that they are deposited mainly upon the undersides of the foliage renders them difficult of access. It is obvious, therefore, why early action is necessary if the best control is to be obtained.

There are a number of ways in which this can be done when dealing with limited areas. Any approved sprays or dusts should be applied about two weeks after the first mites have been observed. If left later until the pest is in millions, the prospect of control is remote. The number of mites present in the early autumn is comparatively small, when compared to the myriads of which these become the progenitors as the season advances.

It has been proved by experiment that spraying or dusting with carbolic preparations is fatal to the mite. Phenyle 1 part to 70 to 80 parts of water or Izal, 1 part to 250 parts of water are both lethal.

A good carbolic dusting powder is made by mixing together thoroughly —1 lb. of 15 per cent. carbolic powder with 4 lbs. of fine superphosphate or other finely ground manure. This can be used as a miticide and top dressing manure, at the rate of 1 cwt. per acre.

The carbolic powder may be used with any other diluent, such as lime or tobacco dust, in the same proportion. The advantage of mixing it with a manure is that it serves a two-fold purpose.

Black Leaf 40 and soap used at the following strength is an effective contact spray. Black Leaf 40 1lb., soap 3 lbs., water 70 gallons.

Another good spray is kerosene 2 gallons, soap ½ lb., napthalene ½ oz. Dissolve the napthalene in the kerosene. Shred the soap and dissolve in one gallon of boiling water. Remove from the fire and add the kero-naphthalene, churning violently for some minutes or until an emulsion is formed. This makes a stock and should be used at the rate of 1 part of stock to 8 parts of water, 1 cake of carbolic Lifebuoy soap in 2 gallons of water is effective. Dusting with Cyanogas Dust A, will destroy the mites. This powder should not be applied to moist foliage, nor when there is any wind. It is distributed per medium of a dust-gun. Powdered naphthalene dusted around plants will repel the mites. There are many other proprietary sprays which are effective.

The big question at issue in regard to this pest, is not how to kill it over a limited or small garden areas, but how to cope with it, over our large pasture lands. What can be economically done on small plots cannot be recommended over broad acres. Certain preventive measures are advised. Burning off of grass or clover lands destroys the over-summering eggs. Generally speaking, this is not possible, as the food is required to carry the stock through to the Autumn, when the young growth makes its appearance. By this time there is not sufficient dry material left to make an effective burn.

Fallowing the land every three or four years is helpful. It generally takes from three to four years after a paddock has become infested for the mite to reach plague form. By turning over the land before the grasses and

clovers have dried off, the mites will be destroyed before they have produced the resting summer eggs. The fallow should be as deep as the nature of the soil will permit and all vegetation thoroughly covered. It is well before doing so to heavily stock the paddocks to eat down the growth and at the same time to get as much benefit as possible from the food present. After ploughing, the ground should be worked down to a good tilth with a compact sub-surface. All following growths of weeds or clovers must be suppressed.

If possible land so treated should be divided from other lands by means of a ditch or drain. It has been definitely proved that the mite is readily re-introduced into a cleaned area per medium of surface running water.

Another good plan, when possible, is to leave a half chain of clear, well worked fallow all around a crop. This checks the wandering mites and also prevents reinfestation per medium of wind blown mites or their eggs.

Before again sowing to a mixed crop of oats, clovers and other suitable fodder grasses, allow a period of two weeks to elapse after the first rains. This will permit of any possible eggs to hatch in the impacted sub-surface soil, where they will die owing to being unable to reach the surface. Such treatment should give a life to the pasture of three to four years, before it will need repeating.

Another method is to allow the mites' eggs to hatch in the autumn and then turn in thoroughly before sowing the crop. Clean fallow throughout the early spring and summer will no doubt guarantee freedom from this pest at time of sowing. The trouble arises from the invasion from outside or contiguous areas. Rolling, when possible, will destroy large numbers of the mites.

The use of any manures that will assist the young seedling plants to grow more rapidly is advised. A plant which stagnates always suffers more from insect or mite attack.

The late or early sowing of crops should be tested out. For late sowing of peas it is claimed they escape the mite attack, due to the fact that the land which was fallow carried no food for the mites, which first issued in the autumn, hence they were starved out.

A fruitful source of breeding this pest is dirty or weedy headlands. This can be overcome by burning off in the spring as soon as it will carry a slow fire. One of the principal means of spreading insects and also the mite, is the use of clover seed in the burr. It is, therefore, strongly advised that only cleaned seed be used when sowing a field.

It is wise not to place all our eggs in one basket, which appears to be the case when we rely entirely upon clovers. It is necessary to try out other approved fodders which have a greater resistance to insect and mite attack. A mixed pasture is also better from an animal diatetic point of view, giving a more balanced ration.

There appears to be a feeling amongst some farmers that greater efforts should be made along the lines of biological control of the mite.

This aspect of the question has never been lost sight of. Biological control has always been a leading feature of the work of this Department, even when other States were not in harmony with this aspect of control as they are now.

In searching for the parasites or natural enemies of this pest, there are unusual difficulties to be overcome. The native home has not yet been determined and this has increased our problem enormously. The only countries in which this mite is known as an economic plant pest are Australia and South Africa.

Every effort is being made to obtain this information from leading authorities of the world and the search for means of biological control is still going on.

A further difficulty is due to the fact that the mites are not insects and that generally they do not attack plant life, being mainly predators or parasites which live upon other animals or insects, or else they are scavengers. There are exceptions to this rule, however, and, unfortunately, we have introduced one of the worst.

Dr. Tillyard, Chief of the Entomological Division of the Council of Science and Industry, visited this State and in conjunction with the writer, made an inspection of several of the infested districts. He admitted with regret, that he could not see at present any practical means, biological or otherwise, in sight for the control of this pest.

There is need for fundamental research of an intensive nature into these obscure and difficult problems, and such research offers the only hope of control.

To this end it has been decided that the exclusive services of an officer of the Commonwealth Council of Science and Industry are to be made available to this State, such officer when appointed, to work in conjunction with this Department.

Having explained these difficulties, it behoves growers to take every method advised by the Department and not sit back relying upon the finding of some natural parasite.

Many insects have their peak years and then subside for several seasons, but this is not the case with the Red-legged Earth Mite; each winter it reappears in its countless millions. The only natural factors which have any checking effect are heat and lack of rain.

FALLOWING FOR FERTILITY.

1.—A STUDY OF PLOT EXPERIMENTS AT THE EXPERIMENT FARM, MERREDIN, 1928-29.

By L. J. H. Teakle, Plant Nutrition Officer,
and
G. H. Burvill, Agricultural Adviser.

INTRODUCTORY.

It has long been recognised by farmers and others following agricultural pursuits that the fertility or crop producing power of a soil is dependent primarily on the nature of the soil. No very accurate definition of "nature of the soil" may be given, but it is intimately connected with the chemical composition of the soil, the content of bacteria and other micro-organisms and the presence or absence of plant poisons in active form. It seems very probable that the fertility of a soil is not generally dependent on any one factor but on the harmonious interaction of numerous factors. Indeed the soil may be likened to a very delicate and complicated machine capable of weaving the finest materials. If any one part of the mechanism is out of adjustment, the work of the whole is upset and the product is faulty. Indications of lack of adjustment are often obtainable by means of a study of such processes as nitrification or the composition of the soil solution, which are dependent directly on such factors as the nature of the soil minerals, the supply of organic matter, the micro-organisms living in the body of the soil, and the moisture available for both crop and microbial flora. The art of soil management consists in keeping the soil in a healthy condition for the production of raw materials for the benefit of succeeding crops. The engineer in charge of modern machinery and entrusted with the maintenance of mechanical adjustment is dealing with a problem less complicated and probably less difficult to manage than the soil-crop system which is being handled by the farmer.

It is only in the last century that science has been of any great assistance in the art of farming, but the results of long and careful research have revealed many of the secrets of crop growth and soil behaviour, enabling the scientist to advise the farmer regarding improvements in his technique which will result in more economical returns.

Not the least of the benefits of science in Agriculture arises from the use of improved cultural methods which affect the physical, chemical and biological factors of the soil. That is cultivation provides a suitable seed bed and releases plant foods by stimulating the growth of desirable micro-organisms. Under conditions of high evaporation, such as apply in Western Australia, a very important result of proper cultivation is due directly and indirectly to the conservation of moisture. If the soil can be maintained at an appropriate moisture content throughout the warm summer months, both chemical and biological processes proceed at a very rapid rate and the soil solution, the very nutrient solution of the growing crop, is enriched with nitrates and sulphates and indirectly with lime, potash, magnesia and other elements. These latter elements are dissolved from the soil by the nitrates and sulphates, the products of the life processes of soil bacteria, so that more or less frequent stirring of the soil, by greatly stimulating the microbial inhabitants, leads indirectly to an increased supply of fertilising materials.

It seems, therefore, that conservation of moisture in any climate of limited rainfall and high surface evaporation or "fly-off" is of paramount importance. Cultural methods for the conservation of moisture result in—

1. Improved moisture supply for the young crop and consequently greater drought resistance;
2. Improved moisture supply for the growth of bacteria which indirectly leads to significant quantities of plant foods being rendered available for the crop;
3. Weeds being controlled and eliminated from competition with the crop for supplies of moisture and minerals;
4. Improved soil conditions whereby the plant roots develop much more vigorously and tap otherwise unavailable supplies of moisture and minerals.

For the conservation of moisture, two conditions must be observed. First, the soil must be mulched to check loss by *evaporation.* Second, the weeds must be destroyed to eliminate loss by *transpiration.* Under Western Australian conditions the mulch is prepared and restored during the process of weed eradication. This mulch provides a blanket preventing capillary movement of moisture to the surface of the soil, but will be ineffective if weeds are able to tap the subsoil moisture and dissipate it in the process of transpiration.

Studies in all parts of the world have shown that considerable quantities of moisture are saved by mulching the soil, especially under arid conditions. Experiments by Buckman (1910) in Eastern Montana showed that the following amounts of moisture, calculated as inches of rain, were stored in mulched and unmulched soils to a depth of five feet.

Mulched soil, 5 feet deep	11.1 inches of rain.
Unmulched soil, 5 feet deep	7.9 inches of rain.
Advantage of mulch	3.2 inches of rain.

In addition the mulch was effective in maintaining the surface layers in a condition relatively more moist than the subsoil layers. Thus, when the soil was considered to a depth of only two feet the following picture was obtained:—

Mulched soil 2 feet deep	5.6 inches of rain.
Unmulched soil 2 feet deep	3.4 inches of rain.
Advantage of mulch	2.2 inches of rain.

Of the moisture to a depth of five feet actually saved by mulching the soil a very large proportion, amounting to 69 per cent., was found to be in the first two feet of soil. This favourable distribution of moisture in the upper layers must greatly benefit the young crop both directly and as a result of the greater store of plant foods arising from increased bacterial activity.

From a knowledge of the wilting coefficient of the soil, that is, the economic limit to which a plant may exhaust the soil of moisture, Buckman calculated that the mulched soil contained more than twice as much available moisture as the unmulched soil and this amount would be sufficient to increase a crop by about one ton of dry matter per acre. If the wheat crop be considered, one ton of dry matter would be equivalent to about 23 cwts. of hay when allowance is made for the moisture contained in wheaten hay. This would also be equivalent to a wheat crop yielding 15-20 bushels per acre.

The effects of fallowing land were investigated in Victoria by Paterson and Scott (1912), who obtained results similar to those reported from the

Northern Hemisphere. Samples were taken from small plots on four occasions during the summer months starting October 16, 1911, and ending February 28, 1912. The soils to a depth of 18 inches were examined for moisture and nitrate nitrogen. The samples represented plots (1) fallowed and kept well mulched; (2) fallowed but not cultivated after October 16; (3) carrying an oat crop. At the end of the experiment on February 28, 1912, the cropped plot showed a deficiency of 2.64 inches of rain and the neglected fallow 2.11 inches of rain when compared with the well mulched fallow.

Interesting figures were obtained regarding the accumulation of nitrate nitrogen and are indicated in Table 1.

TABLE 1.

Nitrate nitrogen content of soil to a depth of 18 inches from plots at Sparrovale Farm, Geelong, Victoria. Figures copied from Paterson and Scott (1912).

Date.	Treatment 1—Well-mulched fallow. Nitrogen.	Treatment 2—Neglected fallow. Nitrogen.	Treatment 3—Under an Oat crop. Nitrogen.
	lbs. per acre.	lbs. per acre.	lbs. per acre.
October 16th, 1911	14·0	17·6	Trace
November 28th, 1911	43·2	44·4	3·3
January 17th, 1912	123·1	60·3	28·1
February 28th, 1912	148·6	58·6	32·5

It is evident that well maintained fallow not only effects a conservation of important quantities of moisture, but also leads to the accumulation of large quantities of nitrate nitrogen. Neglected fallow, probably carrying a generous crop of weeds, is little better than cropped land with respect to moisture and nitrate nitrogen. These results compare favourably with those obtained by Teakle (1928) at the Experiment Farm, Merredin.

EXPERIMENTAL.

In the wheat belt of Western Australia it is recognised that good fallowing is synonymous with good farming. In order to obtain information relative to the effect of fallowing on the soil as well as on the crop yield, the fallowed and unfallowed plots at the Experiment Farm, Merredin, were sampled systematically and the soils analysed for moisture and nitrate nitrogen. Sampling was effected by means of a four-inch "Iwan" post hole digger and a crowbar and the soil samples forwarded to Perth for analysis in tins with close fitting lids which were vaselined to improve the seal. Nitrification was stopped by means of toluene applied in pieces of cotton wool.

Sampling the Plots.—In general, the first foot, the second foot and the third foot layers of the soil were sampled, but the toughness of the subsoil in certain instances limited the sampling to a depth of 28 inches. Where this condition applied the third foot was represented by the soil between 24 and 28 inches and such samples are indicated in the Tables. For the purposes of the experiment, two fallowed plots (plots 3 and 5) and two unfallowed plots (plots 2 and 4) only were sampled. Each plot was ten chains long and samples were taken from the middle (M), from a point about 3 chains from the North end (N) and from a point about 3 chains from the South end (S).

Samplings were made on the following dates:—November 29, 1928; February 13, 1929; March 6, 1929; April 19, 1929, August 20, 1929;

October 21, 1929, and December 11, 1929. More samplings were planned between April and August, 1929, but had to be abandoned on account of unforeseen and pressing work. However, the results show the progress of the moisture and nitrate curves until time of cropping and during the spring, when heaviest demands are made upon the soil. The August sampling was abandoned when half finished owing to rain. The October and December samplings were curtailed on account of inadequate laboratory assistance and were confined to the first and second feet only.

Soil Type.—The soil type is a red brown clay loam, originally carrying salmon gum (Euc. salmonophloia) and gimlet (Euc. salubris). It is slightly alkaline in reaction showing a pH ranging from 7.8 to 8.8. The subsoil is somewhat lighter in colour and shows a very definite accumulation of both clay and lime from a depth of about 12 inches. The soil is recognised to be of high fertility and yields excellent crops of wheat.

Laboratory Methods.—On reaching the laboratory the soils were sieved and 50-gram samples taken in duplicate for moisture determination. Four hundred gram samples were taken in duplicate for nitrate nitrogen estimations, the nitrate being extracted by the Harper method. The moist soil was well mixed by shaking with 395 millilitres (mls.) distilled water and the colloids flocculated by means of 5 mls. normal copper sulphate. The mixture was filtered on large Buchner funnels and the clear filtrate analysed by the Devarda method. The results are expressed as pounds of nitrate nitrogen per million pounds of dry soil (abbreviated p.p.m.).

Field Treatment of Plots.—The fallowed plots were ploughed in June, 1928, to a depth of four inches. They were cultivated in September by means of a springtyne, harrowed after 1.47 inches of rain in February, and cultivated in April and twice before seeding with a springtyne. The unfallowed plots were left to grass and carried a thick growth mainly of barley grass (Hordeum murinum) and burr clover (Medicago denticulata). The surface soil of these plots was well consolidated and showed a marked tendency to crack on drying out in the spring of 1928. They were ploughed early in May with a disc plough and twice cultivated with a spring tyne prior to seeding.

All plots were seeded on May 23, 1929, with 45 lbs. of seed and 120 lbs. of 22 per cent. superphosphate per acre. The variety of wheat used was Gluyas Early.

The Rainfall.—The monthly rainfall at the Experiment Farm, Merredin, during the period of the investigation is given in Table 2.

TABLE 2.

Monthly rainfall in points at Experiment Farm, Merredin, for 1928 and 1929.

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total growing period.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
1928 ...	39	...	101	58	76	107	224	154	71	19	651	...	24	873
1929 ...	50	162	77	...	357	309	119	94	13	35	927	220	5	1,441
Average (1910-1929)	55	56	110	71	134	177	184	134	91	75	795	44	54	1,185

The plots received very little rain in the spring and summer months of 1928 and early 1929, but the May, June and July rains were so generous in 1929 that the soil in both fallowed and unfallowed plots became well saturated with moisture in the early part of the growing season.

The Harvest Returns.—The yields of wheat, calculated as bushels per acre, obtained from the fallowed and unfallowed plots, are reported in Table 3. It must be remembered that of these plots only numbers 2, 3, 4 and 5 were included in the sampling.

TABLE 3.

Yields of wheat, calculated as bushels per acre from fallowed (Plots 1, 3 and 5), and unfallowed (Plots 2 and 4) Plots at the Experiment Farm, Merredin, 1929. (Figures kindly supplied by the Superintendent of Wheat Farms).

Treatment.	Computed Yield per Acre.					Average.	Per cent.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	
Fallowed	24 7	...	24 3	...	18 30	22 13	100
Unfallowed ...	...	18 4	...	14 8	...	16 6	73

The Results.—The results of the analytical work are reported in Tables 4, 5, and 6, and summarised in Tables 7 and 8. A graphical representation of the findings is afforded by Figs. 1, 2, 3, and 4.

The attention of farmers, and non-technical readers generally, is directed to figures in Table 8, where results are expressed in terms of inches of rainfall and pounds of nitrate nitrogen per acre. In addition, in this table and in Fig. 1 an attempt is made to estimate the amount of *available* moisture in the soil at the various samplings. In making these calculations it is assumed that an acre foot of soil weighs 3,750,000 lbs. or about 1,673 tons. Thus 1 per cent. moisture in the soil to a depth of one foot is equivalent to 0.168 inches of rain; one part per million (p.p.m.) of nitrate nitrogen is equivalent to 3.75 lbs. of nitrogen per acre foot. Based on the moisture content of the soil under the crop in the mulching experiment in 1928, it is also postulated that 4 per cent. moisture in the first foot and 8 per cent. in the second and third foot layers are not available for the crop. Thus the soil three feet deep must contain the equivalent of about 3.36 inches of rain before any moisture is readily available for the growing plant. These figures are based entirely on field observations and must ultimately be checked by more accurate determinations of the wilting coefficients under laboratory conditions. In the meantime the figures are very useful for judging the amount of effective moisture in the soils of this type.

TABLE 4.

The Moisture and Nitrate Nitrogen content of the *first foot* of Fallowed and Unfallowed Plots at the Experiment Farm, Merredin, 1929 season.

Plot.	Date of Sampling.						
	Nov. 29th, 1928.	Feb. 13th, 1929.	Mar. 6th, 1929.	Apl. 19th, 1929.	Aug. 20th, 1929. †	Oct. 21st, 1929.	Dec. 11th, 1929.
	Moisture in the Soil.						
Fallow—	%	%	%	%	%	%	%
3 S ...	13·2	7·9	14·2	11·3	...	6·9	12·7
5 S ...	8·4	8·4	11·6	12·1	...	7·0	9·8
3 M ...	11·3	9·7	14·9	13·8	20·0	...	11·6
5 M ...	13·0	6·7	13·1	13·7	...	...	12·6
3 N ...	10·0	9·7	12·5	13·2	16·9	5·4	11·1
5 N ...	6·2	6·5	11·6	11·7	...	5·6	11·1
Average	10·4	8·1	13·0	12·6	18·4	6·2	11·5
Non-Fallow—							
2 S ...	6·3	5·8	12·2	8·6	...	6·5	10·5
4 S ...	6·9	5·6	9·1	8·7	...	5·8	10·7
2 M ...	6·8	6·4	10·1	9·6	18·9	...	10·9
4 M ...	7·2	6·4	11·2	9·6	...	...	10·0
2 N ...	7·2	7·6	8·8	8·1	17·5	6·8	10·9
4 N ...	6·4	6·0	10·0	9·9	15·1	6·9	12·4
Average	6·8	6·3	10·2	9·1	17·2	6·5	10·9

† Sampling curtailed on account of rain.

TABLE 4—*continued.*

The Moisture and Nitrate Nitrogen content of the *first foot* of Fallowed and Unfallowed Plots at the Experiment Farm, Merredin, 1929 season.

PLOT.	DATE OF SAMPLING.						
	Nov. 29th, 1928.	Feb. 13th, 1929.	Mar. 6th, 1929.	Apl. 19th, 1929.	Aug. 20th, 1929. †	Oct. 21st, 1929.	Dec. 11th, 1929.
NITRATE NITROGEN IN THE SOIL.							
Fallow—	ppm.	ppm.	ppm.	ppm.	ppm.	ppm.	ppm.
3 S	16·4	25·0	16·8	23·8	...	2·8	6·2
5 S	10·8	14·9	20·8	15·6	...	5·8	9·2
3 M	19·7	21·0	22·4	20·9	2·3	...	6·8
5 M	16·7	23·2	27·8	21·2	...	...	10·3
3 N	6·9	12·9	13·6	22·9	1·1	3·4	5·4
5 N	24·3	11·6	18·7	22·5	0·9	3·0	5·7
Average	15·8	18·1	20·0	21·1	1·4	3·8	7·3
Non-Fallow—							
2 S	2·0	4·4	6·1	11·7	...	1·4	6·4
4 S	1·6	5·6	15·0	11·3	...	2·7	5·3
2 M	4·3	3·7	20·8	9·2	1·4	...	7·7
4 M	2·2	4·4	14·9	15·0	...	...	11·8
2 N	1·5	4·3	9·6	10·7	0·8	1·6	5·9
4 N	2·6	3·9	14·6	66·8*	0·9	3·7	4·3
Average	2·4	4·4	13·5	11·6	1·0	2·4	6·9

* Not included in the average. † Sampling curtailed on account of rain.

TABLE 5.

The Moisture and Nitrate Nitrogen content of the *second foot* of Fallowed and Non-fallowed Plots at the Experiment Farm, Merredin, 1929 Season.

PLOT.	DATE OF SAMPLING.						
	Nov. 29th, 1928.	Feb. 13th, 1929.	Mar. 6th, 1929.	Apl. 19th, 1929.	Aug. 20th, 1929.†	Oct. 21st, 1929.	Dec. 11th. 1929.
MOISTURE IN THE SOIL.							
Fallow—	%	%	%	%	%	%	%
3 S	16·4	15·3	15·2	16·0	...	12·1	12·2
5 S	12·8	13·4	13·6	12·7	...	12·2	13·2
3 M	16·7	15·0	15·1	15·5	18·4	...	12·1
5 M	15·7	13·8	13·4	14·5	...	...	12·3
3 N	14·3	13·8	14·8	14·1	16·2	8·6	10·8
5 N	11·6	12·8	11·2	13·3	16·4	8·3	10·6
Average	14·6	14·0	13·9	14·4	17·0	10·3	11·9
Non-Fallow—							
2 S	12·2	10·6	13·0	13·2	...	9·6	12·9
4 S	10·5	10·7	10·9	10·9	...	10·4	12·1
2 M	12·1	10·2	11·7	12·0	20·4	...	11·7
4 M	12·0	10·0	11·3	11·5	...	...	11·6
2 N	11·6	8·6	11·8	10·9	20·4	10·2	11·4
4 N	10·3	10·4	11·1	11·1	15·1	10·5	11·3
Average	11·4	10·1	11·6	11·6	18·6	10·2	11·9
NITRATE NITROGEN IN THE SOIL.							
Fallow—	ppm.	ppm.	ppm.	ppm.	ppm.	ppm.	ppm.
3 S	9·8	13·1	12·0	14·5	...	17·6	5·2
5 S	20·0	16·1	8·7	9·3	...	18·7	19·2*
3 M	19·4	12·0	12·6	14·0	15·0	...	3·9
5 M	27·0	7·5	18·8	19·7	...	...	7·2
3 N	4·0	7·5	5·0	11·4	6·7	10·8	4·1
5 N	14·3	8·1	12·0	18·1	3·4	3·7	4·3
Average	15·8	10·7	11·5	14·5	8·4	12·7	4·9
Non-Fallow—							
2 S	9·2	2·6	3·3	3·0	...	1·2	11·6
4 S	0·1	7·5	24·5*	11·0	...	8·0	3·1
2 M	9·7	3·0	9·3	4·6	3·9	...	5·4
4 M	11·1	5·0	6·9	8·8	...	...	7·8
2 N	0·8	2·7	3·6	3·1	0·3	1·5	0·9
4 N	1·2	2·2	8·3	18·2	0·9	2·5	2·5
Average	5·4	3·8	6·3	6·1	1·7	3·3	5·2

* Not included in the average. † Sampling curtailed on account of rain.

TABLE 6.

The Moisture and Nitrate Nitrogen content of the *third foot* of Fallowed and Non-Fallowed Plots at the Experiment Farm, Merredin, 1929 Season.

Plot.	Date of Sampling. Feb. 13th, 1929.	Mar. 6th, 1929.	Apl. 19th, 1929.	Aug. 20th, 1929.*
Moisture in the Soil.				
Fallow—	%	%	%	%
3 S	04·1	14·6	13·8†	...
5 S	...	...	...	...
3 M	12·6	13·4†	15·3†	17·7
5 M	...	...	...	...
3 N	14·7	15·3	13·6	16·2
5 N	...	...	14·9	17·8
Average	13·8	14·4	14·4	17·2
Non-Fallow—				
2 S	10·0‡	12·7‡	13·0‡	...
4 S	...	...	...	...
2 M	11·7‡	11·9‡	12·9‡	18·5
2 M	...	...	...	...
2 N	10·0‡	14·3	10·1‡	17·4
4 N	...	...	11·4‡	17·0
Average	10·6	13·0	11·9	17·6
Nitrate Nitrogen in the Soil.				
Fallow—	ppm.	ppm.	ppm.	ppm.
3 S	14·1	27·5	11·2‡	...
5 S	...	...	...	...
3 M	14·2	15·4‡	18·7‡	25·3
5 M	...	...	...	...
3 N	12·2	5·2	13·9	22·8
5 N	...	...	23·5	12·1
Average	13·5	16·0	16·8	20·1
Non-Fallow—				
2 S	4·6‡	3·4‡	5·1‡	...
4 S	...	...	...	...
2 M	5·1‡	8·9‡	7·4‡	16·9*
4 M	...	...	...	...
2 N	2·6‡	2·9	3·9‡	0·3
4 N	...	...	13·5*, ‡	3·3
Average	4·1	5·1	5·5	1·8

* Not included in the average. † Sampling curtailed on account of rain. ‡ Sample represents soil between 24in. and 28in.

TABLE 7.

Summary of Results expressed in Tables 4, 5. and 6.

	Date of Sampling. Nov. 29th, 1928.	Feb. 13th, 1929.	Mar. 6th, 1929.	Apl. 19th, 1929.	Aug. 20th, 1929.*	Oct. 21st, 1929.	Dec. 11th, 1929.
Moisture in the Soil.							
Fallow—	%	%	%	%	%	%	%
1st foot	10·4	8·1	13·0	12·6	18·4	6·2	11·5
2nd foot	14·6	14·0	13·9	14·4	17·0	10·3	11·9
3rd foot	...	13·8	14·4	14·4	17·2	...	...
Non-fallow—							
1st foot	6·8	6·3	10·2	9·1	17·2	6·5	10·9
2nd foot	11·4	10·1	11·6	11·6	18·6	10·2	11·9
3rd foot	...	10·6	13·0	11·9	17·6	...	...
Nitrate Nitrogen in the Soil.							
Fallow—	ppm.	ppm.	ppm.	ppm.	ppm.	ppm.	ppm.
1st foot	15·8	18·1	20·0	21·1	1·4	3·8	7·3
2nd foot	15·8	10·7	11·5	14·5	8·4	12·7	4·9
3rd foot	...	13·5	16·0	16·8	20·1	...	...
Non-fallow—							
1st foot	2·4	4·4	13·5	11·6	1·0	2·4	6·9
2nd foot	5·4	3·8	6·3	6·1	1·7	3·3	5·2
3rd foot	...	4·1	5·1	5·5	1·8	...	...

* Sampling curtailed on account of rain.

TABLE 8.

Summary of results in Tables 7, expressing moisture in terms of inches of rainfall and nitrate nitrogen in terms of pounds of nitrogen per acre.

	Date of Sampling.						
	Nov. 28, 1928.	Feb. 13, 1929.	Mar. 6, 1929.	Apl. 19, 1929.	Aug. 20, 1929.*	Oct. 21, 1929.	Dec. 11, 1929.
Moisture in Soil Expressed as Rain.							
Fallow—	points.	points.	points.	points.	points.	points.	points.
1st foot	175	136	218	212	309	104	193
2nd foot	245	235	234	242	286	173	200
Total, 1st and 2nd foot	420	371	452	454	595	277	393
3rd foot	...	232	242	242	289	...	...
Total, 1st, 2nd and 3rd foot	...	603	694	696	884	...	...
Available moisture, 1st and 2nd foot	**218**	**169**	**250**	**252**	**393**	**75**	**191**
Available moisture, 1st, 2nd and 3rd foot	...	**268**	**358**	**360**	**548**	...	...
Non-fallow—							
1st foot	114	106	171	153	289	109	183
2nd foot	191	170	195	195	312	171	200
Total, 1st and 2nd foot	305	276	366	348	601	280	383
3rd foot	...	178	218	200	296	...	...
Total, 1st, 2nd and 3rd foot	...	454	584	548	897	...	...
Available moisture, 1st and 2nd foot	**103**	**74**	**164**	**146**	**399**	**78**	**181**
Available moisture 1st, 2nd and 3rd foot	...	**118**	**248**	**212**	**561**	...	...
Nitrate Nitrogen as Pounds per Acre.							
Fallow—	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1st foot	59·3	67·9	75·0	79·0	5·2	14·2	27·4
2nd foot	59·3	40·2	43·2	54·4	31·5	47·7	18·4
Total, 1st and 2nd foot	118·6	108·1	118·2	133·4	36·7	61·9	45·8
3rd foot	...	50·7	60·0	63·0	77·3	...	...
Total, 1st, 2nd and 3rd foot	...	158·8	178·2	196·4	113·9	...	...
Non-fallow—							
1st foot	9·0	16·5	50·7	43·5	5·2	9·0	25·8
2nd foot	20·2	14·2	34·8	22·8	6·4	12·4	19·5
Total, 1st and 2nd foot	29·2	30·7	85·5	66·4	11·6	21·4	45·3
3rd foot	...	15·4	19·1	20·6	6·8	...	...
Total, 1st, 2nd and 3rd foot	...	46·1	104·6	87·0	18·4	...	...

* Sampling curtailed on account of rain.

DISCUSSION OF RESULTS.

The salmon gum and gimlet type of soil as represented by the plots studied at Merredin seems to be very rich in available nitrogen, and the processes whereby nitrogen is rendered available seem to be exceptionally active. Fallowing leads to a large accumulation of nitrate nitrogen, the

form of nitrogen most readily available for crop growth, but even unfallowed land very rapidly reaches a relatively high state of fertility with respect to nitrate if rains are forthcoming. Thus, following the good rains in February, 1929, the nitrate nitrogen content of the unfallowed soils more than doubled. A dry April following led to a substantial loss of nitrates although there was no apparent loss of moisture. The loss was very probably due to the renewed activity of the other microbes which began to decompose the plant roots and other organic matter in the soil and required the nitrate as "food" for the process. The nitrate seemingly lost would find its way into the bodies of the bacteria, fungi, etc., now flourishing in the warm, moist soil and would not be available for the use of a crop until after the death of these organisms and the decomposition of their nitrogenous constituents to form nitrate again. This would probably occur during the following season.

A similar effect followed the rains in November, 1929, when the nitrate nitrogen in the soil of the fallowed plots showed a slight decrease by the December sampling. This decrease may have been associated with the absorption of nitrates by microörganisms stimulated to a greater degree of activity than were the nitrifying (nitrate producing) bacteria. The unfallowed soils, already low in nitrate as a result of the growth of the crop, responded to the November rains with an increase in the amount of nitrate nitrogen. The increase was just sufficient to bring both the fallowed and unfallowed plots to the same level of nitrates as well as moisture at the December sampling.

The effect of fallowing may be discussed under two heads:—

1.—As a means of conserving moisture.

If one considers the amount of available moisture in the first two feet of the fallowed and unfallowed plots up to the time of the April sampling, it is seen that the fallowed soil had an advantage to the extent of an average of one inch of rain, which is almost equal to the total amount (1.22 inches) available in the unfallowed soil. Very generous rains in May, June and July, 1929, fully saturated the soils in this instance so that at subsequent samplings no difference could be observed between the moisture content of the fallowed and unfallowed plots under the crop. This means that by the time of the August sampling, when the crop was about 18 inches tall and growing very vigorously, the crop on the fallowed plots must have made use of the advantage in moisture due to the fallowing.

The advantage of fallowing as a means of improving the moisture supply at Merredin in the season under review seems to have been dissipated by the exceptionally heavy early rains which benefited the unfallowed soil relatively to a greater extent than the already moist fallowed soil. It is interesting to observe further that the soil was never reduced to the limit of available water but had a reserve equivalent to about 75 points of rain in the surface two feet in October following a long dry spell. While it is not possible to decide whether this reserve was sufficient to allow adequate moisture absorption for maximum crop growth, it seems probable that, under the conditions at Merredin in that season, moisture conservation did not *directly* affect the crop yield to any great extent.

2.—As a means of affecting soil fertility.

Recent investigations in America, particularly at the New Jersey Expermient Station, have shown that nitrification (the process of forming nitrates) in the soil is a reliable index of soil fertility provided that other factors are controlled. The process of nitrification not only liberates nitrate nitrogen but leads to the decomposition of the soil minerals to render available many other elements, such as calcium (lime), potassium (potash) and magnesium, which are required by growing crops. In addition, the rapidity of the process depends on the suitability of the physical and chemical conditions in the soil. As the wheat plant requires conditions in many ways similar to those conducive to rapid nitrification, it is more than likely that soils which favour the production of nitrates will be suitable for the production of wheat.

Throughout the period of the experiment the fallowed soil was vastly superior to the unfallowed soil with respect to nitrate nitrogen. This probably means that the fallowed soil was also much better as a medium for the growth of wheat, apart from any moisture relations. No facts can be presented to indicate the underlying causes of this improvement. Whatever these contributing causes may have been, they are measured in this instance by the degree of accumulation of nitrates. It seems certain that this accumulation of nitrates was occasioned by the early effects of the fallowing on the tilth and the moisture content of the soil during the warm summer months.

That it is not simply a question of increased supplies of readily available nitrate nitrogen is suggested by the fact that ample quantities for the use of the crop were present both in the fallowed and unfallowed soils prior to seeding, and these supplies were never entirely exhausted during the growth of the crop. It has been estimated by Warington (1909) that a 30-bushel crop of wheat will require a total of 50 lbs. of nitrogen per acre. Assuming that 50 lbs. per acre were required in this case, it is evident that the plants were never in need of nitrogen. In addition, it has been found that applications of nitrogenous fertilisers, either at seeding in the autumn, or both at seeding and in the spring, do not materially improve the yield of wheat at Merredin. The results of the Nitrogen Experiment for 1929 are given in Table 9.

TABLE 9.

Yields of wheat receiving dressings of available nitrogen as sulphate of ammonia on fallowed and unfallowed plots at the Experiment Farm, Merredin. All plots were drilled on June 12th, 1929, with 45lbs. of seed and 120lbs. 22% superphosphate per acre. Certain plots then received dressings of ammonium sulphate as shown below. (Figures kindly supplied by Superintendent of Wheat Farms.)

Treatment with Ammonium Sulphate.	Unfallowed.		Fallowed.	
	Per acre.	Per cent.	Per acre.	Per cent.
	bus. lbs.		bus. lbs.	
Experiment 1, replicated 6 times—				
½ cwt. at Seeding ; ½ cwt. in August	15 45	105	18 43	99
None (Control)	15 4	100	18 57	100
1 cwt at Seeding	13 21	89	18 58	100
Experiment 2, replicated 4 times—				
1 cwt. at Seeding ; 1 cwt. in August	16 30	105	18 12	101
None (Control)	15 46	100	17 58	100
2 cwts. at Seeding	15 28	98	18 56	105

The fact remains that the increased yields as a result of fallowing parallel the increased accumulation of nitrate nitrogen in the fallowed plots. The increased yields are undoubtedly the result of the interaction of a large number of factors. The factors include the improved physical nature or tilth of the well cultivated soil, the better moisture condition during the summer months, and other soil conditions which are reflected in the nitrate content of the soil and the resultant harvest returns.

SUMMARY AND CONCLUSIONS.

The fallowed and unfallowed plots at the Experiment Farm, Merredin, were sampled systematically from November, 1928, to December, 1929, and the soils examined for moisture and nitrate nitrogen contents.

The prevailing soil was a red brown clay loam representing the type usually carrying salmon gum and gimlet in the virgin state.

Two plots represented each of the conditions of fallow and non-fallow, and each plot was sampled at three sites, usually to a depth of three feet.

The results of analyses are reported in the tables and in the form of curves. A study of these results in the light of plot yields leads to the following conclusions regarding this type of soil in the Merredin district:—

1. Fallowing leads to a substantial accumulation of nitrate nitrogen and conservation of moisture as well as improved harvest returns.

2. In April, 1929, the fallowed plots contained nearly 110 lbs. more nitrate nitrogen per acre three feet deep than did corresponding unfallowed plots. This is equivalent to 550 lbs. of sulphate of ammonia or 710 lbs. of nitrate of soda.

3. In April, the fallowed plots contained a greater amount of moisture than did the corresponding unfallowed plots. This advantage was equivalent to nearly 1.50 inches of rain distributed through the soil to a depth of three feet.

4. The fallowed plots (3) gave an average yield of 22 bus. 13 lbs. per acre while the unfallowed plots (2) yielded only 16 bus. 6 lbs. per acre or 73 per cent. of the yield on the fallowed plots.

5. The enormous increase of nitrate nitrogen in the fallowed plots is due to the favourable tilth of the soil and the improved moisture conditions during the summer and autumn months.

6. Exceptionally heavy rains in May, June, and July, 1929, eliminated detectable differences in the moisture content of the plots under test whether fallowed or unfallowed. Under these conditions the substantial advantage in yield of the fallowed plots, amounting to over 6 bushels per acre, seems associated rather with other benefits accompanying the cultivation of the soil during the spring, than directly with the conservation of moisture. The satisfactory soil tilth and higher moisture content during the summer months favoured the activity of beneficial bacteria, as shown by the large accumulation of nitrate nitrogen.

7. The crop yields show that this soil condition proved more favourable for the growth of wheat as well as for desirable bacteria.

8. While in a dry season, or in dry districts, the advantage of fallow is intimately associated with the amount of moisture conserved, in favourable seasons the advantage seems more intimately associated with more subtle factors such as soil tilth and the nature of the soil solution as affected by the summer activity of micro organisms.

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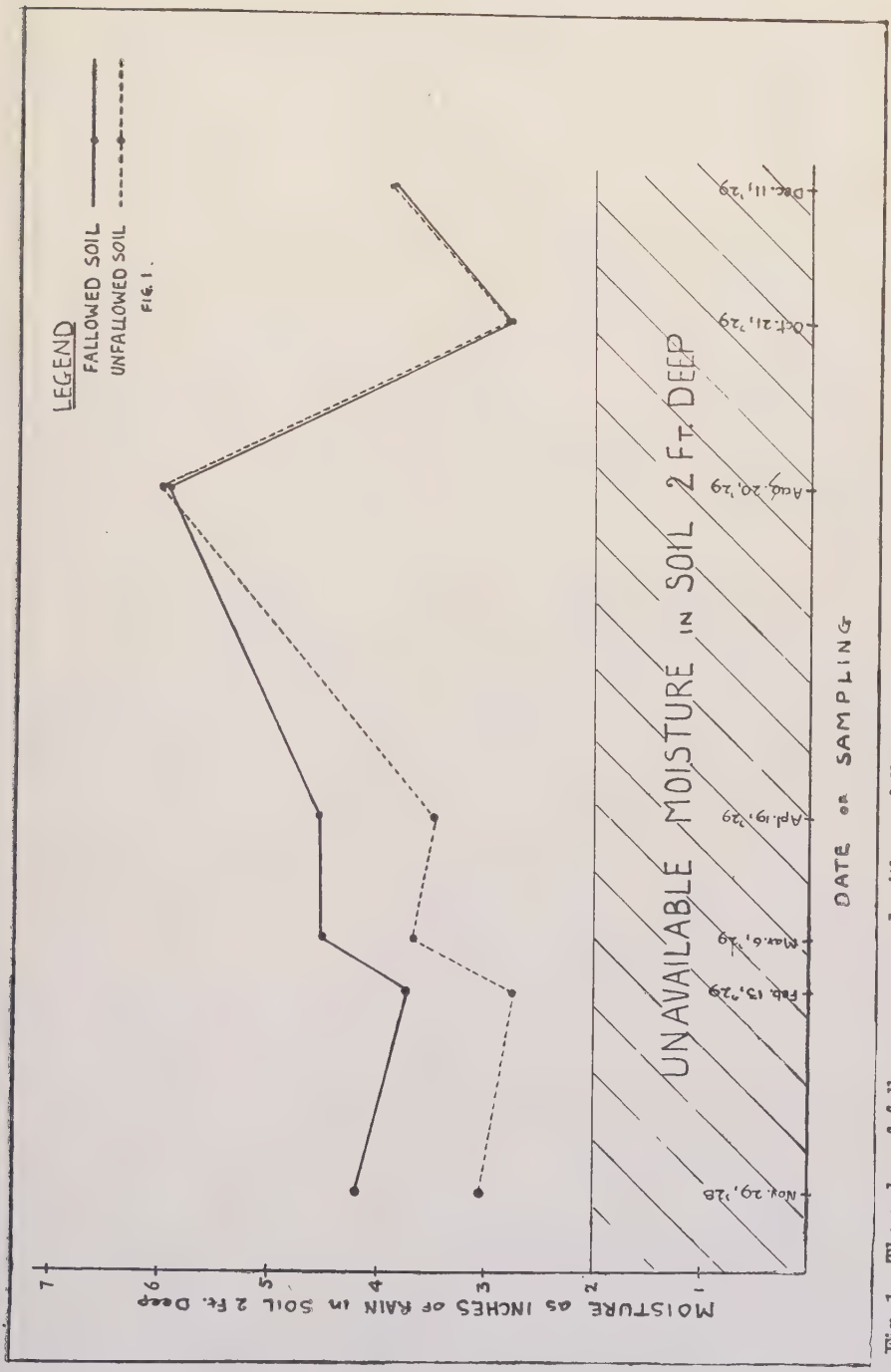


Fig. 1.—The value of fallow as compared with non-fallow, in terms of rainfall stored in the soil at the Experiment Farm, Merredin, to a depth of two feet.

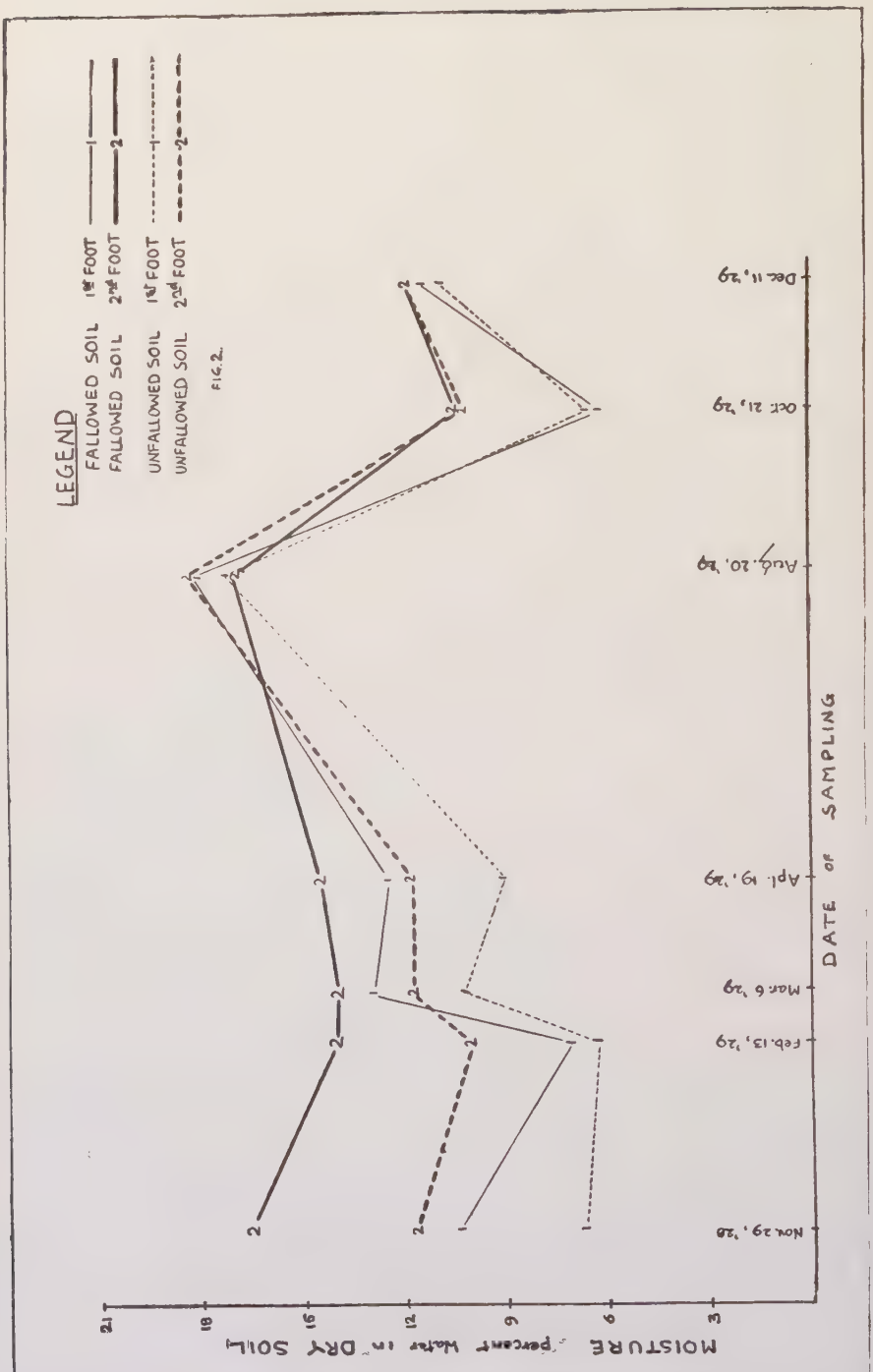


Fig. 2.—Fluctuations in moisture contents of fallowed and unfallowed soils to a depth of two feet at Experiment Farm, Merredin. The plots were sown May 23rd, 1929, with 45 lbs. Gluyas Early and 120 lbs. superphosphate per acre.

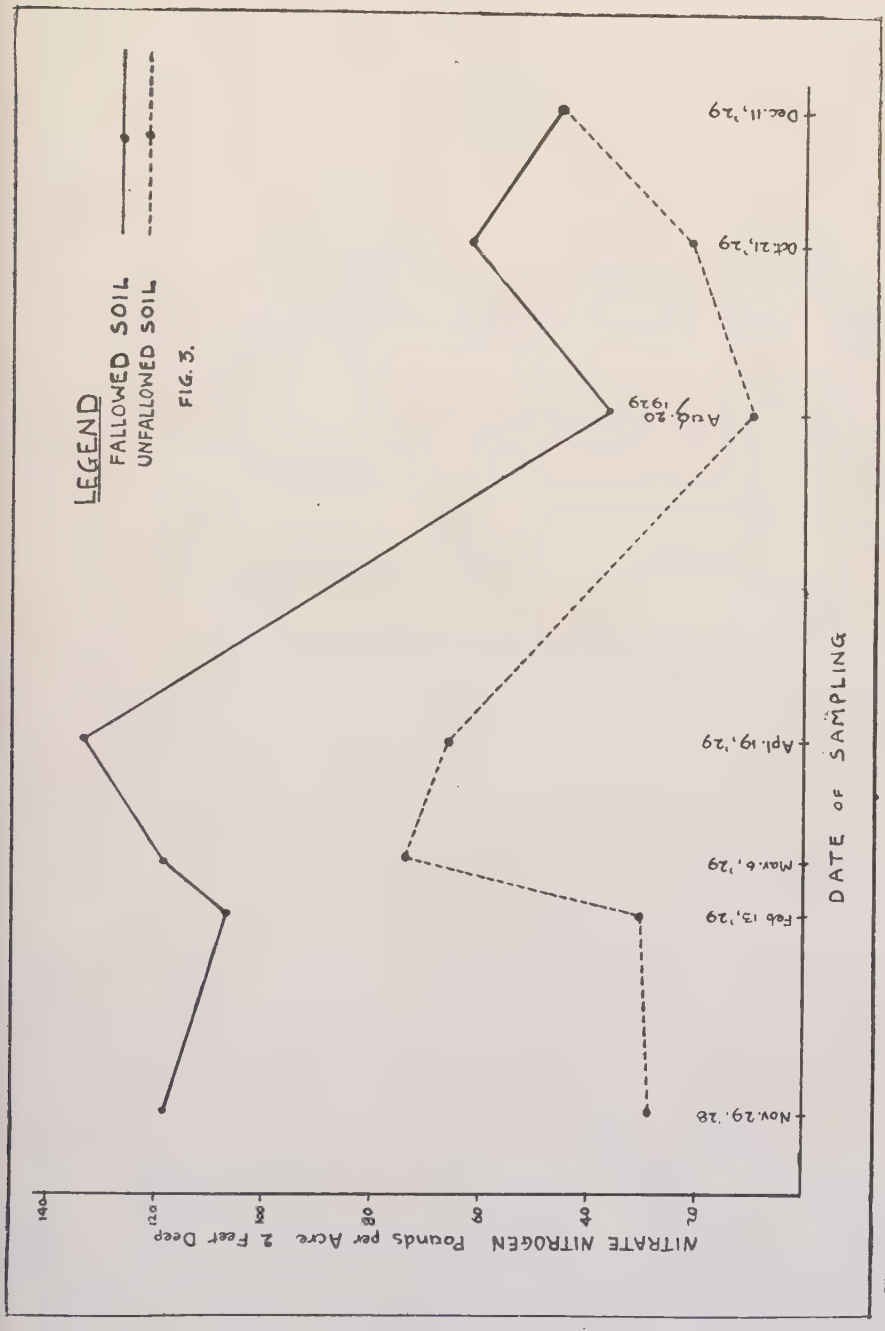


Fig. 3.—The value of fallow as compared with non-fallow, in terms of nitrate nitrogen in the surface two feet of soil at the Experiment Farm, Merredin.

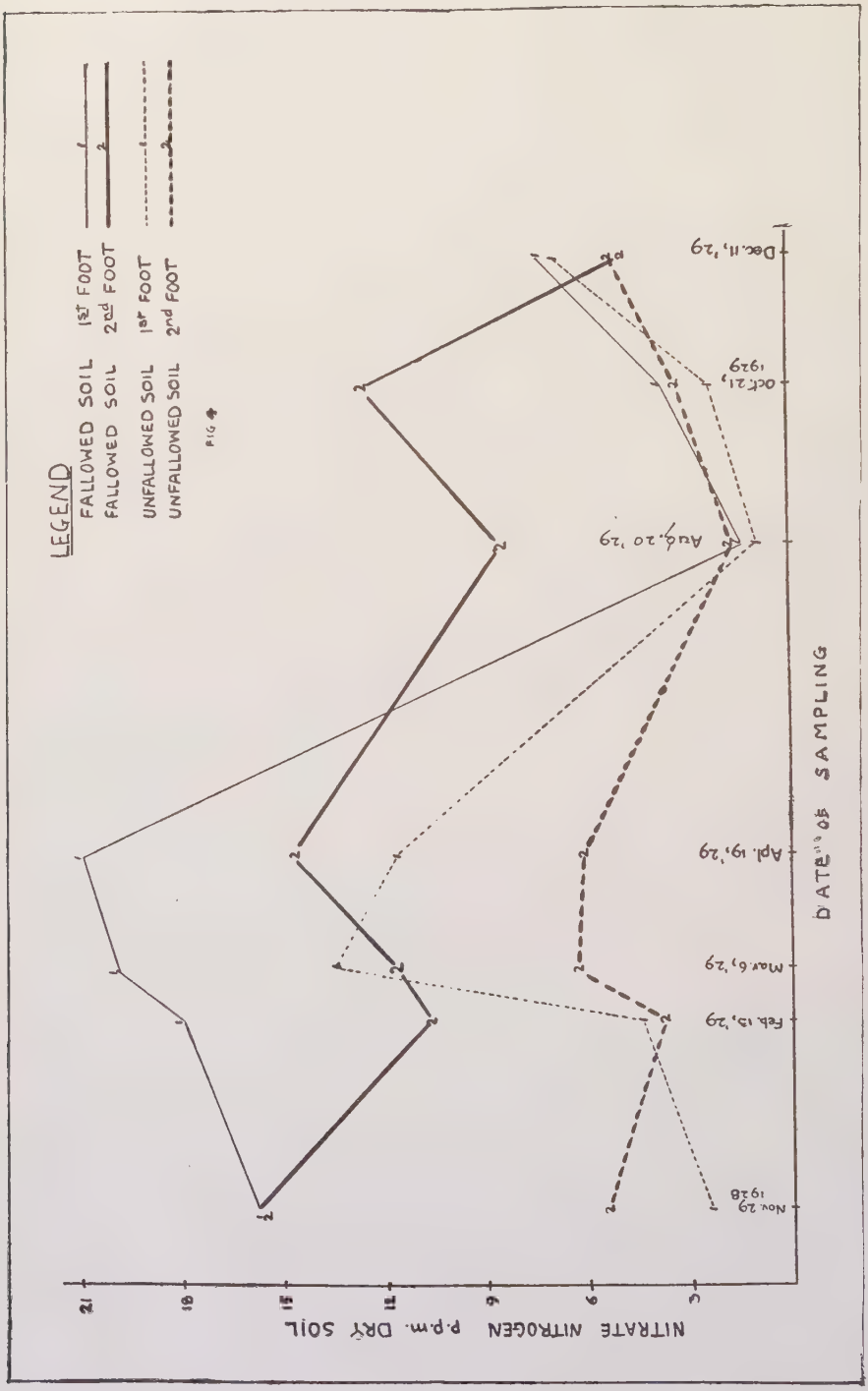


Fig. 4.—Fluctuations in nitrate nitrogen contents of fallowed and unfallowed soils to a depth of two feet at Experiment Farm, Merredin. The plots were sown May 23rd, 1929, with 45 lbs. Gluyas Early and 120 lbs. superphosphate per acre.

THE BEST KEPT FARM COMPETITION.

MANJIMUP.

M. CULLITY,
Agricultural Adviser, Dairy Branch.

This competition was made possible by the generosity of the Hon. Edwin Rose, M.L.C., who provided a Cup for competition among the dairy farmers of the Manjmup district.

The local Agricultural Society has been instrumental in organising and arranging the competition. All settlers in the Manjimup and Pemberton districts being eligible to compete.

This is the second such competition to be organised in this district. The previous one, which the writer also had the honour of judging, was organised by the Jardee Settlers' Association in 1927.

The following scale of points were adopted. This being identical with the scale used in a recent competition in the Harvey District.

Farm Stock (preference given to Dairy Stock of the Zone Type)	50
Pastures	40
Supplementary Fodder Crops	30
Conservation of Fodder	30
Farm Buildings and General Lay-out, including Fencing	35
Farm Implements and Dairy Utensils	15
Total Points	200

Sixteen entries were received and the properties covered a wide stretch of country. From Mr. W. Green's Farm, on Group 23, Manjimup, to Mr. J. South, Group 2, Fly Brook, Pemberton, is approximately 45 miles.

It is to be regretted that some of the older residents did not see fit to enter their farms. All the entries that were received were from farmers making their start as group settlers. This fact, to an extent made judging a little difficult. All these farms, with the exception of Mr. Egginton's, were established at the same time. The same style of buildings, fences, and systems of layout, were adopted in all cases, and judging had to take into account the neatness with which work was executed, to distinguish between farms.

Mr. Eggington's farm has not been included in this scale of points. This settler has not been on his holding as long as the other entrants, and naturally his farm has not yet reached the same degree of development. Mr. Eggington has one cow only, this, of course, for his home. His farm generally gives one an impression of painstaking effort to achieve the degree of neatness and cleanliness that prevails. In a year or two, when his pastures have hardened and are carrying stock, this farmer will have to be reckoned with in any similar competition.

The following is a list of the competitors, with the areas laid down to pastures and crops.

Name.	Area in Pasture.	Area in Crops.	Address.
	Acres.	Acres.	
Nicol, R.	...	5	Group 19, Manjimup.
Green, W.	50	19	Group 23, Manjimup.
Murdock, P. G.	37	18	Group 31, Jardee.
Kjellgren, W.	37	25	Group 31, Jardee.
Wirth, A.	40	27	Group 21, Jardee.
Griffiths, W.	...	10	Group 8, Pemberton.
Hunter, D.	55	23	Group 8, Pemberton.
Kjellgren, A. ;	72	19	Group 31, Jardee.
Underwood, S.	80	23	Group 5, Manjimup.
Bailey, T.	54	14	Group 21, Jardee.
Nelson, C.	70	9	Group 21, Jardee.
Haig, R.	40	5	Group 21, Jardee.
Saunders, D.	70	8	Group 25, Jardee.
South, J.	26	9	Group 2, Pemberton.
Goulden, H.	28	22	Group 21, Jardee.

Included in cropping are self-sown oat crops.

The points allotted at each farm follow in table form. From this it will be seen the first three competitors are as follows:—

A. Kjellgren .. .. 178 Points.
D. Hunter .. .. 174 „
W. Kjellgren .. .. 172 „

Scale of Points.

Name.	Stock.	Pasture.	Supplementary Fodder Crops.	Conservation of Fodder.	Buildings, Fencings, etc.	Implements and Dairy Utensils.	Total.
Kjellgren, A. ...	46	37	30	16	34	15	178
Hunter, D. ...	42	32	35	18	33	14	174
Kjellgren, W. ...	47	35	33	18	28	11	172
Murdock, P. G. ...	40	34	22	26	31	13	166
Griffiths, W. ...	43	37	28	18	27	12	165
Wirth, A.	40	34	22	18	31	15	160
Bailey, T.	50	36	14	16	31	11	158
Nicol, R.	48	37	5	30	26	10	156
Underwood, S. ...	41	31	30	16	24	12	154
South, J.	46	33	17	16	24	10	146
Nelson, C.	42	35	10	16	23	9	145
Goulden, H. ...	45	32	15	10	24	11	137
Saunders, D. ...	43	38	10	14	22	8	135
Green, W.	40	30	17	...	26	10	123
Haig, R.	41	36	5	7	22	8	119

BULLS IN USE.

As all the competitors are on group holdings, the bulls conformed to the zone breed (Guernsey). Ten of the competitors are owners of bulls and a perusal of their pedigree gives one an idea of the type of animal being used.

Name of Owner.	Name of Bull.	Production of Bull's Dam.
Hunter, D.	Denmark Faithful Chief (Reserve Champion, Perth R.A. Show, 1929)	407lbs. fat.
Nelson, C.	Robin of Nundorah (Champion, Perth R.A. Show, 1929)	400·96 lbs. fat.
	Minnamurra Prairie Don	442 lbs. fat.
Nicol, R.	Denmark Favourite Chief	407 lbs. fat.
Griffiths, W.	Koojan Moses	410 lbs. fat.
Kjellgren, W.	Minnamurra Handsome Bay ...	360·78 lbs. fat.
Kjellgren, W.	Minnamurra Hector	221·0 lbs. fat.
Bailey, T.	Minnamurra Valentine (1st Prize, Novice Class, Perth R.A. Show, 1929)	233·51 lbs. fat.
South, J.	Minnamurra Charter	320 lbs. fat.
Wirth, A.	Roland of Koojan	251 lbs. fat.
Underwood, S.	Muresk Priam	242·44 lbs. fat.

DAIRY COWS.

In practically all cases, the stock inspected were in good condition, but in one or two instances, odd cows were low in condition, while in some herds the provision of a stock lick would have done the little necessary to have gained full points.

Here, again, the effect of the pure bred herd bulls may be seen. Below in Table 4 will be seen an analysis of the stock on the farms, the number of first-cross cows in profit, and the number of younger animals coming on. I must make special mention of the foresight of Mr. R. Nicol in obtaining a number of grade heifers when opportunity offered about eighteen months ago. To-day Mr. Nicol's position is that, of a total number of 28 cows in milk, sixteen are first-cross heifers, and of a total number of fifty-five head of cows, heifers, and calves, there are forty two-grade Guernseys.

A perusal of the table below will give some idea of the extent to which grade heifers will become available.

Name.	Total Cows, Heifers and Calves.	Total Cows in Milk.	Guernsey Grade.			
			Cows in Milk.	Heifers.	Calves.	Total.
Nicol, R.	55	28	16	14	12	42
Nelson, C.	25	15	3	...	6	9
Kjellgren, A.	22	12	5	...	7	12
Kjellgren, W.	27	16	5	4	6	15
Goulden, H.	26	14	1	5	6	12
Bailey, T.	20	10	4	2	7	13
Haig, R.	12	7	1	...	3	4
Wirth, A.	21	15	1	2	2	5
Murdock, P. G.	18	10	1	3	5	9
Saunders, D.	21	13	3	4	2	9
Griffiths, W.	27	12	2	6	3	11
Hunter, D.	27	16	3	3	6	12
Underwood, S.	34	25	1	6	2	9
outh, J.	16	9	2	4	2	8

The value of the Zone System of dairy herd improvement will be demonstrated in an even more convincing manner as time goes on. When herds, where continuous use of one breed of bull has been made, are compared with those where the breed has been frequently changed, the demonstration is complete.

The rearing of calves does not present any difficulty to any of the competitors. Through the wise policy of avoiding over-stocking, sufficient run is available for the young stock. The existence of a close market for cream, ensures the separation of the milk at home and the utilisation of the skim for the feeding of calves and pigs. In all cases the rearing of the young stock reflects great credit on the competitors.

PIGS.

As yet, this adjunct to the running of milch cows is not receiving the attention it warrants. The absence of whole milk depôts and cheese factories means that the farmer has his skim milk for feeding. While the majority of the competitors have one brood sow or more, one or two have not any, and as a consequence are losing a sum which in their circumstances may be called considerable. Even where brood sows are kept, the treatment and housing is not what is desired. Messrs. Bailey, Hunter, and Green show the way in this respect. Proper shelters should be erected, and farmers should remember that pigs are essentially clean animals. Where paddocks are sub-divided, so that the pigs may be changed around, allowing the shelters to sweeten and providing the pigs with pasturage, best results follow.

Where pigs are confined to sties, insanitary conditions are likely to arise, and in the winter months as often as not, the sties become sloppy, thus making conditions favourable for an outbreak of pneumonia. Further, to this, sloppy, insanitary sties are a source of danger to the people who have to work near, or in them.

PASTURES AND CROPS.

A good pasture will contain a mixture of grasses and clovers. Luxuriant growths of sub-clover were inspected on each holding. Only to a small extent in a few paddocks was there any sign of a mixed pasture. Mr. A. Kjellgren's flat in the front of his house, being an example of this, in fact, is a good example to the other competitors in the utilisation of flats not being used for cropping. This flat, though small, carries Mr. Kjellgren's stock for a great part of the summer. Some small shade trees are appreciated by the cattle, as is the permanent stream of running water.

Subterranean Clover forms the bulk of the herbage and is gradually crowding out the smaller clovers and grasses. Where this is so, the weeds in the pastures, ferns, dandelions, scotch thistle, etc., receive attention from the stock.

Some good examples of sowing on the burn were seen, particularly that on Mr. W. Griffiths' property, Group 8, Pemberton. Here ten pounds of clean seed was sown and was top-dressed with two and half hundredweight of super. in two dressings. This now is covering all the ground. The total cost to bring it to this stage was only £3 per acre, as against £15 to £20 under the old system. A point of interest here was a section sown on the burn, but seeded with Subterranean in the burr. One and a-half bags per acre of burr were used. Here the result, though good, was not nearly equal to where clean seed was used. A bag of burr will contain from five to twenty pounds of clean seed. So that one can see the comparisons of burr

against clean seed are not fair unless the seed content of the burr is known. Bearing this in mind, farmers are warned against buying in the burr, as the variable seed content, weed seeds are spread with eggs of the Lucerne flea, and the red-legged velvet earth mite.

To provide a change from clover one competitor, Mr. W. Kjellgren, followed a wise course. About twenty-two acres of oats were sown and all has been grazed. Mr. Kjellgren knew when he was sowing about how much he would require to cut for hay (about eleven acres) so that he has been able to graze eleven acres the whole season, so giving his cows in these paddocks a mixture of oats and clover. In all cases top-dressing with super. in the autumn was carried out and in some cases a second spring top-dressing was given.

The main winter crop, supplementary to the Subterranean Clover was oats. About fifteen acres being sown on an average on each farm. Two small crops of wheat were sown; five acres of Canberra by Mr. A. Kjellgren was sown very late, and will not yield a big crop; five acres of Nabawa by Mr. R. Nicol, was a very fine crop and will return a good cutting of hay.

Lucerne is not receiving the attention it warrants. This crop has been proved to be a reliable one, providing the farmer gives it reasonable care. In all twenty acres are being utilised by competitors for this crop.

Other crops to receive attention were rape by Mr. W. Green, for his pigs; barley for early feed, by Messrs. Wirth, Hunter, and Murdock; turnips and sweeds by Messrs. Wirth, Nelson, and Saunders.

All were preparing land for summer crops, maize, Sudan grass, millet and mangolds. The necessity for early cultivation of these crops should be stressed. The resultant conservation of moisture achieved by early and thorough cultivation will often mean the difference between success and failure.

CONSERVATION OF FODDER.

On each holding was inspected varying quantities of hay, lucerne, clover, and oats, being utilised for this purpose by farmers. Here one may stress again the advantages of lucerne in as much as this crop gives green feed, when it is most needed and can be cut for hay when clovers and grasses are abundant. Some excellent hay was seen, particularly the clover hay of Mr. P. G. Murdock. This was beautifully made, little leaf being lost, and an excellent colour and aroma being achieved. With reference to this one might stress the importance of getting the clover hay into the stack quickly, or if carting in has to be delayed owing to pressure of work, then the importance of making large cocks in the field. Where the clover lies out in windrows in the usual hay-cutting weather, the material becomes bleached and brittle. This applies also to the material when it is made into small cocks. In good weather clover hay can be in the sheds in three days.

As a general rule, the oat crops are cut much too late. In fact, the crops are almost ready for threshing, so that the stalks are little better than straw, and much grain is lost in handling.

BUILDINGS AND GENERAL LAYOUT AND FENCING.

In this section thirteen of the fifteen competitors have buildings conforming to the same pattern. The two differing being the first two prize winners. Mr. Kjellgren has the regulation group milking shed, hay shed and dairy, but these he has had erected with a view to neatness and ease in working. Extra to this he has erected a two-storey barn. The upper storey being a

hay loft, whilst the lower is cart and machinery shed and stables. Mr. Kjellgren's buildings are also conspicuous for the cleanliness of their surroundings. Mr. D. Hunter has a regulation shed which he does not use, but has erected another longer building with a loose box for his bull. His stables and hay shed are separate. All are strongly built and are neat.

DAIRIES.

Settlers must remember that the quality of the butter made in our factories is influenced primarily on the farms. It is impossible for the most up-to-date machinery to make a high grade article if the farmer is neglectful and dirty. With the handling of milk and cream too much care can never be taken. Because only a small number of points were allotted for dairies, settlers must not look upon this side of the farm as of little importance.

During my inspections two dairies stood out above the others; these were those under the supervision of Mrs. A. Kjellgren and Mrs. Wirth, and both ladies are to be complimented on the high standard attained.

One aspect of the competition to which consideration was given, although it was not actually listed separately, was the matter of water for stock. This was included in the section "Layout." The provision of water, particularly during the summer time, is of utmost importance to all stock and in particular milking stock.

GENERAL REMARKS AND CONCLUSION.

During the visits of inspection I was very pleased to note the friendly rivalry that was apparent and also the endeavour to excel and improve. If all such competitions are as fortunate in the entrants, then the task of the judge is made so much easier.

One or two points may be noted before concluding.

(1) *Pastures.*—Farmers should endeavour to encourage the growth of grasses and not rely on sub. clover only. They may sow more oats than they require to cut for hay, or Perennial and Wimmera rye grasses and Cocksfoot with their oats, or may broadcast the grass seeds on a field cultivated in early autumn.

(2) *Sowing of Oats and Barley for Early Autumn Feed.*—For early feeds, Burt's Early or Mulga Oats will be found to give good results if sown in time to germinate with the early rains.

(3) *Cutting of Hay and Silage at the proper time and Curing Correctly, where Silage is being made.*—See that it is made without encroaching on to the hay-cutting season. Silage cannot be made profitably if the crop is ready for hay cutting.

(4) *Early and thorough Cultivation for Summer Crops.*—Early and thorough cultivation for summer crops will mean that the crops start away well and that sufficient moisture will be held in the soil to ensure a good crop.

(5) More attention can be directed to pig raising and the smaller side lines, potato growing, vegetables, if only for home use. The provision of a few fruit trees for the home.

(6) Shelter should be arranged for stock for both summer and winter. The stock will appreciate it and pay for it.

In conclusion, I wish to express my thanks to the competitors for the ready way they have met me with what information was desired and other courtesies extended.

INTERIM REPORT ON THE PROTECTION OF YOUNG CITRUS TREES FROM FROST.

E. R. West, Griffiths Research Station, N.S.W.

(Courtesy of the Council of Scientific and Industrial Research.)

During the winter of the year 1929 an experiment was carried out to test various methods of frost protection for young citrus trees. Owing to the great individual variation in the susceptibility to frost of trees treated in any one particular way, the results were in some respects indefinite; nevertheless, results were obtained which seem of sufficient importance to record.

Continued low temperatures or very severe frosts will kill citrus trees; on the other hand, good commercial fruits are not grown in the tropics, so that commercial citrus growing is limited to more or less subtropical regions, which, as a general rule, are subject to frosts during the winter. Should these frosts be severe, damage will be done either to the fruit or tree. Comparatively severe frosts will destroy the fruit, and very severe frosts will defoliate the mature tree, and may even kill the main branches. The only known practicable method of preventing such damage is by orchard-heating, but this method is so expensive as to render it doubtful whether such expenditure is profitable. If the chances for the occurrence of many frosts of such intensity are very great, the locality should be considered unsuited to citrus culture. Young citrus trees are very much more susceptible to frost than old trees, and frosts that do no damage to either the fruit or foliage of old trees may completely kill young trees. In almost all citrus-growing districts, during some seasons at least, frosts serious enough to damage young trees occur, so that a method of treatment that will prevent or lessen the risk of frost damage to young trees, other than orchard-heating, which is too expensive, would be of great value.

Many methods of protecting plants from frost are in common use. Methods that depend on covering the plant with an insulating material, or with a screening material, are suitable for young citrus trees. They include—

(1) Smudge fires that will cover the orchard with a dense smoke screen, which will intercept the radiant heat given off by the plants and the soil on a frosty night. Such fires are not to be confused with fires used in orchard-heating, that are sufficiently numerous to actually warm the air, and in this way keep up the temperature without the creation of a smoke-screen. Sufficient evidence has not been adduced to show that smudge fires are of any use at all in frost protection, and reliable opinions now deny any benefit due to a smudge (1), so that the use of smudge fires need be considered no further.

(2) Covering part or the whole of the tree with straw, hessian, or some such material. Some protection from frosts should be expected from such treatment. The question arises as to the most efficacious method of covering the tree, and the de-

(1) Hume, H. H. (1926). The Cultivation of Citrus Fruits, p. 337, Macmillan & Co.

gree of protection afforded, and whether any ill effects other than frost result from the treatment. It has been observed that where hessian is wrapped around the stem of the tree, and becomes wet with rain or dew, it may freeze on frosty nights, and actually increase the risk of frost.

(3) Mounding up soil around the stem. Loose soil is such a poor conductor of heat that anything covered with a few inches of soil will certainly be protected from frost in any locality in which citrus trees can be grown. Hume (2) recommends this method, while Coit (3) does not favour the method on account of the danger from gum diseases.

It was decided to try various methods of frost protection on a grove of young Washington navel trees, planted on the square system in thirteen rows of nine trees each during the winter of the year 1929.

The trees had all been planted out in the spring of the year 1928, most were two years old from the bud at the time of planting, a few were three years old from the bud, and a few one year old from the bud (i.e., were budded autumn 1927).

The following treatments were selected for trial:—

1st—No protection.

2nd—Stem protected with hessian. A wirenetting tube about 3in. in diameter was folded round the stem and the hessian was wrapped around this tube.

3rd—Several layers of newspaper were wrapped around the stem and tied with string.

4th—Clean loose soil was mounded up round the stem, forming a cone varying from 1 to 18 inches high.

5th—Hessian sacks (chaff bags) were placed over the trees, the open ends being lightly buried in the soil.

6th—As in 5th treatment, but the hessian was first dipped in tar and then in sand. This was done to see what effect such complete shading would have on the tree, as in many methods of frost protection most of the sunlight is excluded.

7th—The trees were completely wrapped in a thick covering of straw, so that no green leaf or stem was visible.

With the 117 trees available, seventeen trees were used for all but two of the seven treatments, and for these two treatments sixteen trees only were available.

The different treatments were distributed throughout the block. In the first seven trees of the first seven rows each treatment was distributed at random, with the restriction that each treatment occurred once in each row and each column. The treatments in the next six rows were again filled in at random with the same restriction, so that each treatment but one occurred twice in each column of thirteen trees. The two end trees of each row not allotted treatments thus far (there being nine trees in a row) were then allotted treatments at random, no treatment being allotted twice until all other treatments had been allotted. The field was flat and soil uniform, and there was no reason to expect more severe frost in one part of the field than another.

(2) Hume, H. H. *Ibid.*

(3) Coit (1922). Citrus Fruits, p. 245-246, Macmillan & Co.

Three very severe frosts were experienced on the mornings of June 12th, 13th and 14th. The minimum temperatures in degrees Fahrenheit near this field were as follows:—

	June		
	12th	13th	14th
On lawn (terrestrial)	—	13.8	14.8
On bare soil 2 cms. above ground ..	22.0	20.7	22.1
1 metre above ground	25.1	23.0	24.7
2 metres above ground	27.1	24.0	26.1

This frost coming in the early winter was responsible for much damage to young citrus, and is the frost that caused the damage here reported.

The protections were removed from the trees on 26th September, 1929, when danger from further frosts was negligible, and the trees were examined for frost damage, and notes were taken. A further inspection was made on 4th December, 1929, to confirm the first observations; the reason for this was that in cases of frost damage a tree may look healthy in the spring, but owing to frost injury to the bark on the stem, may succumb soon after active growth commences, on the other hand some trees look completely killed, but buds will burst and the tree recover.

The trees were grouped into four classes according to their condition after the winter, viz:—

(1) Dead.
(2) Dead above the union of the scion and the stock, but stock still alive.
(3) Main stem alive, but branches dead.
(4) Unaffected. This group includes those trees that have healthy stems and green and healthy branches. In some cases the trees may have been defoliated, or a few of the smaller shoots may have been killed, but a large proportion of the main branches were alive and green.

The trees of the first two groups had to be replanted, while in the case of the second two groups it was not necessary to replant.

Table 1 shows the complete data. The number of trees of each age has been shown, and as was expected, an inspection of the totals in the bottom row indicates a high positive association between trees one year old when planted and fatal frost injury, and this must, therefore, be borne in mind in further considering the data.

Table 2 summarises the results for the trees two years old at time of planting, as restricting the data to trees of a uniform age gives a more trustworthy comparison. In this table the first two and second two classes have been grouped together, giving two generalised classes, and for each treatment the proportion of trees falling into these two classes is given to the first approximation. The number of trees from which this proportion has been calculated is given in the fourth column.

Compared with the untreated trees it appears that every treatment except covering the tree with hessian, either tar-dressed or otherwise, has afforded some degree of protection; but these two treatments have been definitely injurious.

The most efficient treatments appear to be wrapping the stem with paper, and mounding up the stem with soil. The hessian wrapped round a cylindrical wire frame probably acts as a screen to the stem of the tree, intercepting the radiant heat, while the paper wrapping and soil act as

insulating materials retarding the conduction of heat from the tree to the colder exposed surface.

The effects of the mounding with soil were interesting. Table 1 shows that ten out of a total of seventeen trees had their branches destroyed, but the main stems protected by the soil survived. It was noticed that, almost without exception, where soil was mounded up around the stem, the bark was destroyed just where the stem emerged from the soil, but a few inches below the soil the stem was quite healthy. It appeared that the injury at this part was more severe and more general than in the other treatments where no soil was mounded up. It would, therefore, appear that mounding up with soil is a very sure protection against frost for that part of the tree covered with a few inches of soil, but greatly increases the liability to frost of that part emerging from the soil. It is well known that the most susceptible part of the citrus tree to frost is the union of the scion and stock. This has always been explained by the assumption that the union is a naturally weak part of the tree. May it not be that frost injury is greatest at this part, because under ordinary conditions it is near the surface of the ground?

It is evident that placing a hessian sack over the tree is in some way injurious, as trees treated in this way suffered more damage from frost than unprotected trees. The hessian bent the foliage over, and probably gave very little protection to much of the foliage, as the twigs were pressed against the hessian which was coated with frost crystals on frosty nights. It is possible that a hessian screen supported on framework over the trees in such a way that the hessian does not come into contact with the foliage may give better results; but such an arrangement, even if found to be satisfactory, would probably be too expensive. Although not apparent from the results summarised in Table II. the tarred hessian was even more injurious than the untreated hessian, as it was noticed that the foliage died much sooner under the tarred hessian. This may have been due either to the more complete shading or to a direct chemical injury. Trees completely enveloped in straw appeared to gain some measure of protection, but as only nine two-year old trees were used in this treatment, no great reliance can be placed on the results.

It is possible that in the case of most protective coverings, the final effect is, broadly, the result of two opposing factors. Checking the falling in temperature of the tissues of the tree is a beneficial factor, while interference with photosynthesis, aeration, and other processes is a detrimental factor, inasmuch as a certain weakening of the tree results, and it would appear from observation that a tree in any way weakened, such as by partial wilting, presence of excess salt in the soil, or by poor nutrition, or mechanical injury, is more susceptible to frost injury; so that the amount of benefit or otherwise that any protection affords is dependent on the relative intensities of these two factors. It has been noticed also that tissue which seemed quite healthy when coverings were removed, died later after exposure. This point, however, requires further investigation. In this connection Hume (4) advises against completely burying the tree in soil on account of the resultant injury.

It cannot be said that these results are as yet very conclusive. It is evident that where only small differences exist a very much larger number of trees should be used than were here available. It is hoped to repeat similar trials in the future; but certain difficulties exist.

(4) Hume—*loc. cit.*

Firstly, an orchard having recently planted uniform trees, and situated on level land free from any influences likely to cause differences in frost liability in different parts of the orchard, is required, and such an orchard is very difficult to find.

Secondly, the success of the trial will depend on whether frosts sufficiently severe to do much damage occur, and after all, the chances are of course against this in a citrus-growing district.

SUMMARY.

A trial was made of different methods of protecting young orange trees from frost. It appeared that—

(1) wrapping a few thicknesses of paper round the stem gave very effective protection;

(2) mounding soil up round the stem was effective protection to the stem, but increased the injury to the branches;

(3) protecting the stem with a cylindrical wire-netting frame 3in. in diameter covered with hessian was less effective;

(4) placing a hessian bag either tarred or not tarred over the tree was distinctly detrimental.

It is felt, however, that further trials could be carried out with advantage.

TABLE I.

Age of Tree when Planted.	Dead. years. 1	2	3	Dead to Bud Union. years. 1	2	3	Stem Alive. years. 1	2	3	Unaffected. years. 1	2	3	Total.
1.—No Protection	3	3	3	0	2	0	0	1	0	0	5	0	17
2.—Hessian over Wire ...	3	1	0	0	2	0		...		2	8	1	17
3.—Paper round Stem ...	1	1	0	0	1	0		...		0	12	1	16
4.—Mound of Soil	0	0	1	1	1	0	2	8	0	0	4	0	17
5.—Hessian over Tree... ...	1	8	0	2	5	0		...		0	1	0	17
6.—Tarred Hessian over Tree ...	2	7	2	0	3	1	0	2	0		...		17
7.—Straw over Tree	5	3	0		...		0	2	1	0	4	1	16
Total	15	23	6	3	14	1	2	13	1	2	34	3	117

TABLE II.

	Dead to Union.	Stem Alive.	Number.
	Proportion of Total.		
No Treatment	·5	·5	11
Hessian over Wire	·3	·7	11
Paper round stem	·1	·9	14
Mound of Soil	·1	·9	13
Hessian over Tree	·9	·1	14
Tarred Hessian over Tree	·8	·2	12
Straw over Tree	·3	·7	9

THE BACON PIG.

G. K. BARON-HAY,
Superintendent of Dairying.

In closely settled areas where dairying is carried on as the principal source of revenue, the rearing and fattening of pigs should prove a profitable sideline.

While specialised pig farms do exist on which large herds of pigs are kept, the general rule is for pig-keeping to be associated with some other type of farming. This point was particularly stressed by the Imperial Economic Committee when submitting their report on Pigs and Pig Products within the Empire last year.

This fact is specially of value in Western Australia to-day, in view of the efforts being made to develop the extreme South-West portion of the State.

Since the inception of the Group Settlement Scheme, some 1,750 dairy farms have been created, in addition to private settlement which is not inconsiderable. The problem of stocking this large number of holdings with dairy cattle has been difficult. It has proved quicker to produce new areas of pasture and to grow fodder crops than to breed the necessary dairy cattle to consume this pasture. In the opinion of the writer, dairy farmers, especially those recently established, must look for other sources of revenue—in addition to butter-fat production and other means than through milch cows—to transform green fodder into marketable products.

The two primary products for which there is a ready market in this State to-day are:—

1. Milk products—butter, cheese, etc.
2. Pig products—pork, ham, bacon, etc.

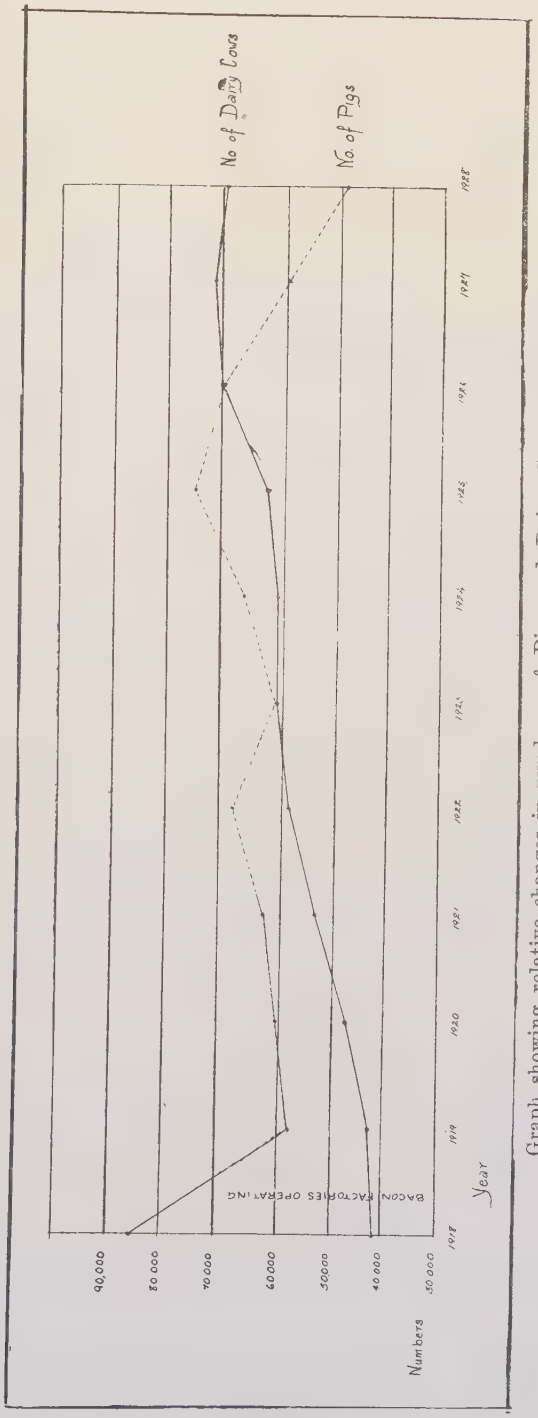
The following table shows local market for pig products.

	1924-25.	1925-26.	1926-27.	1927-38.	1928-29.
	£	£	£	£	£
Consumption	356,426	402,877	300,438	341,835	358,273
Production	137,221	227,405	133,770	147,473	132,400
Local market available ..	219,205	175,172	166,668	194,362	225,873

Pig farming has not progressed in Western Australia commensurate with the increase in dairy cattle, or with the development of the South-West portion of the State.

From the accompanying graph it is seen that the number of pigs has fluctuated greatly from year to year, but has remained on the average constant, while the number of dairy cows has shown a continued increase.

This rapid fluctuation of the pig population is in itself an argument in favour of developing the pig industry, indicating as it does the capacity of



Graph showing relative changes in numbers of Pigs and Dairy Cattle, 1918-1928.

the pig above all other farm animals for rapid reproduction. The cow is only able to increase at a very slow rate in comparison, as is shown in the following table:—

	Annual Increase. Per cent.
Cattle	80-90
Sheep	95-115
Pigs	1200-1800

Several reasons are advanced for the apparent unpopularity of the pig industry:—

1. Fluctuation in the prices of pig products.
2. Fluctuation in prices of feedstuffs, being an indirect cause of 3.
3. The change of pig population from the Wheat Belt to the dairying districts of the State.
4. Disease.

1. *Fluctuation in the price of pig products* is not a local phenomena, but is apparently a feature of the world trade in these products. In European countries an attempt has been made to work out a definite periodicity curve for the prices of pig products, and investigations* have shown that a definite "cycle" can be observed between high prices and low production and low prices and high production. These "cycles" vary from three to four years. This fluctuation is ascribed tentatively to rapid over-production, causing a fall in price, and as rapid a fall in production consequent on dissatisfaction with the low prices, causing a scarcity and consequent rise in price. Owing to the rapidity with which the number of pigs can be increased, the whole "cycle" takes approximately four years.

However, at present this condition of affairs does not occur as far as this State is concerned, as a local market for pig products exists of approximately £225,000, which market is continually increasing.

2. *Fluctuations in prices of foodstuffs.* Suggestions have been made that periodical fluctuations in the pig population have been caused by the price of the main feeding stuffs, in this State wheat or its products. This may to a certain extent be true, but an elaborate examination in Germany into the prices of foodstuffs and the stocks of pigs discounts the theory that there is a close association between the "cycle" of pig production and the prices of foodstuffs.

On only a few farms in this State has an attempt been made to provide the majority of foods required for the production of bacon, and these farms are more or less free from the effects of fluctuations in the prices of foodstuffs, particularly pollard, which, in the Dairy Belt, has been the main concentrate fed to pigs. This subject will be dealt with at a later date in this Journal.

3. *One effect of the high price of wheat,* which has ruled until recently, has been the transference of the pig population from the Wheat Belt area to the Dairy Belt. Wheat farmers have found it as profitable to sell any "seconds" or "cracked" wheat on the local market to feeders, and so avoid the labour entailed in feeding pigs. With the rapid development of the Dairy Belt, increasing numbers of pigs are being bred on dairy farms, and it is to the South-West that bacon factories must in the future look for their supplies.

* "Pigs and Pig Products, 1929," Report of Imperial Economic Committee.

4. *Disease* has been advanced as a reason for the fluctuations in our pig population, but this State has been remarkably free from serious disease during the period under review. The outbreak of swine plague in 1927, though causing a great deal of inconvenience to farmers in the affected area, caused a depletion of not more than 2,000 head of pigs. This outbreak, through creating a fear of disease in the minds of farmers, no doubt did act as a deterrent on those who may otherwise have developed the pig-raising side of their operations.

The percentage of pigs condemned for disease at the abattoirs now, however, is very light, approximately one per cent., pointing to the healthy condition of our pigs as an average, the principal disease being tuberculosis.

Whatever be the cause or causes of the fluctuations mentioned above, there is no doubt that farmers have practised an "in-and-out" policy in their pig-farming, endeavouring to come into the business at the top of the market, a policy which benefits only those who remain constantly in the business and can sell their weaner pigs at high prices. A moment's reflection on the price of weaner pigs during the last 18-20 months indicates how profitable these have been to breed, weaner pigs having fetched as high as 30s. per head.

It is believed that by developing the pig industry on sound and systematic lines, dairy farmers, and in particular those on recently developed farms such as under the Group Settlement Scheme, can convert much of the produce grown on the farm into a marketable product, namely bacon, where difficulty would be experienced in doing this should reliance be placed on the cow only which, as has been shown, increases at a low rate, and are difficult to procure.

It is not sufficient, however, to grow pigs and sell them. It is necessary to produce the article required by the trade. With this end in view, the Hon. Minister for Agriculture (Mr. H. Millington) recently called a conference, inviting members of the bacon trade to discuss this question and arrive at a uniform policy, so that farmers throughout the State may have a definite line on which to work.

The following were present at the conference:—Hon. Minister for Agriculture (Mr. H. Millington), Director of Agriculture (Mr. G. L. Sutton), Superintendent of Dairying (Mr. G. K. Baron-Hay), Mr. Gray, Manager Stock Department, Elder, Smith & Co., Ltd., M. T. Wilding, President, and Mr. W. G. Burges, Councillor, of Royal Agricultural Society, Messrs Reid and Robinson, representing Foggitt Jones Pty., Ltd. Messrs. Bantock and Watson were unable to attend.

Type of carcase.—It was unanimously decided that the type, conformation, and general quality of carcases which meet the requirements of bacon curers also meet those of the pork trade, and *vice versa.*

It is undesirable and there is no need to introduce complications into pig production by requiring farmers to produce two distinct types of pigs according to whether they wish to supply the pork or the bacon market. Insofar as any variations exist in carcases demanded by these two sections of the industry, such variations are those only of weight and not type, given proper methods of feeding. *This decision is of outstanding importance, as it is often assumed that different breeds or crosses are required to produce animals best suited to the pork and bacon markets respectively.*

It was decided that carcases for the pork or bacon trade should conform to the following specification:—

DESCRIPTION OF STANDARD CARCASES FOR PORK OR BACON IN WEST. AUSTRALIA.

The carcase must be that of a properly fed castrated male or virgin female pig.

The middle portion from the first rib to the hip or aitch bone must be long. The fore end must be light, with a light head and neck, and the hams well developed. Ribs must be well sprung, that is to say, they must not slope rapidly from the back bone, but clearly indicate where the back leaves off and the side begins. The line of the back must be slightly arched from head to tail, and not dished or humped over the shoulder. The neck must be of medium length and devoid of crest. The shoulders must be smooth, slightly rounded from side to side over the top and very compact. The back fat should be even, without pronounced thickening over the shoulder, and it should taper slightly from the shoulder to the rump, and should not be greater than 1½ inches at the shoulder in the bacon pig.

The underline must be straight and thick throughout its whole length, entirely free from flabbiness or distention of the flank. Thick lines or streaks of fat should be absent from the visible portion of the lean, and indications of leanness must be visible between the ribs.

The shanks must be short, bone fine, and the fore hock and ham free from wrinkles. The flesh must be carried well around the bone, leaving no bareness inside the thigh and well down to the knee and hock joints.

The vertibrae must be of a flesh pink colour and flinty in texture. The proportion of lean to fat must be good. The fat should be white and firm to the touch; when pressed with the thumb, an indentation should be formed which remains visible for a few minutes after pressure has been removed.

The texture of the lean must be fine grained, and not rough or fibrous. There must be no excess of internal fat—the kidneys should have a thin covering of fat.

The rind must be thin, flesh coloured, perfectly smooth, pliable and free from deep-rooted bristles, and must be devoid of any skin pigmentation. There must be no indication of black bristles and no sign of seedy cut.

The following carcase weights were decided upon as being in most demand by the trade, and most profitable to the producer:—

	Carcase weight.	Live weight.
	lbs.	lbs.
For Porker	50-70	72-100
For Bacon—Grade 1 ..	100-115	143-164
Prime ..	116-130	165-186
Grade 2 ..	131-140	186-200

Farmers are not advised to market porkers of a less carcase weight than 50 lbs. or a greater weight than 70 lbs., although many such pigs are continually being forwarded to the sales. It is more profitable to "run" a pig over 70 lbs. to the bacon stage, as it is from this weight onwards that a pig shows the greatest daily gain. This weight is also an "out size" and not in demand by either the pork butcher or the bacon curer.

The following table gives the relative value per lb. of carcases at the weights shown, and demonstrates clearly the advisability of keeping within the grade weights as recommended above:—

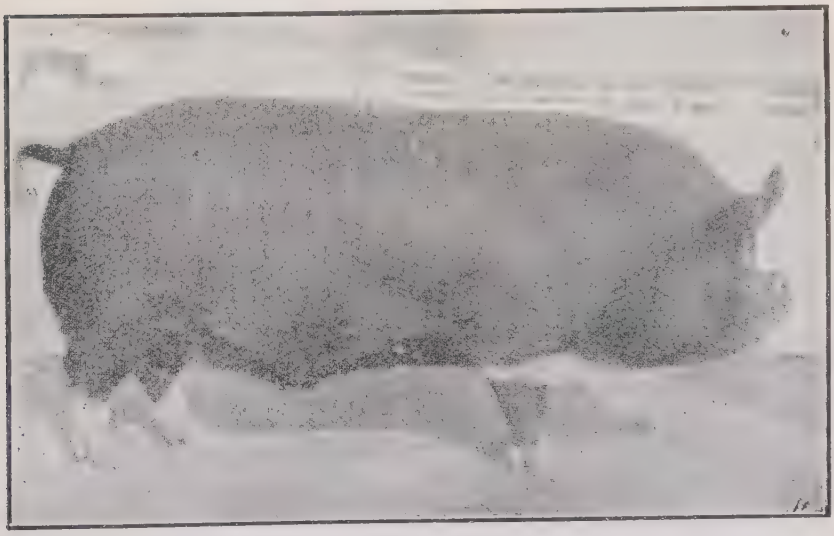
Carcase weight. lbs.	Value per lb.	Value per carcase at top weight. £ s. d.
50-70	10d.	2 18 4
100-115	8d.	3 16 8
116-130	8d.	4 6 8
131-140	7¾d.	4 10 5
141-150	7½d.	4 13 9
151-160	6d.	4 0 0
161-180	4½d.	3 7 6

A pig weighing 140 lbs. carcase weight fetches 3s. 9d. more than one of 130 lbs., and has to be kept at least 10 days longer.

A pig of 150 lbs. weight fetches 3s. 4d. more than one at 140, and 7s. 1d. more than one at 130 lbs., and has to be kept 10 days and three weeks longer respectively.

Carcases conforming to the description given above produce a high proportion of the best cuts whether as pork, or bacon, and are the product of selective breeding and proper feeding methods.

A Pure Bred Berkshire Boar.



The Pure Bred Berkshire Boar is recommended for "Grading-up" herds of any breed, and is particularly desirable for mating with Tamworth or Tamworth Grade Sows for the production of bacon.

The task of the farmer is to supply the carcase thus described, which involves two factors:—

(a) Breeding.

(b) Feeding, to be considered in a later issue of this Journal.

Breeding.—The question of breed was considered also by the conference mentioned above. It was unanimously agreed that, for West Australian

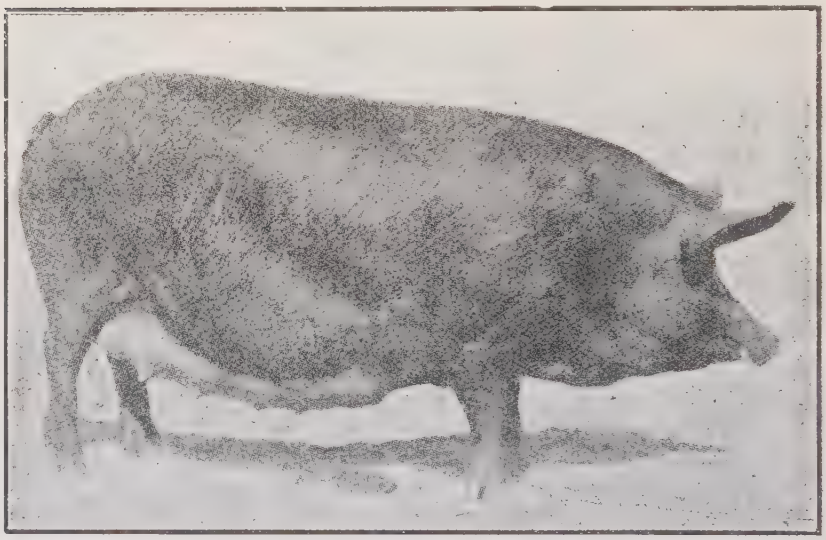
conditions, a combination of the Berkshire and Tamworth breeds yielded the best bacon pig, and also an excellent porker.

The ideal pig would be obtained by the production of the breeding sow from mating pure-bred Berkshires with pure-bred Tamworths, and mating the sows from this cross back to a pure-bred Berkshire boar. This is known as the "Berkshire-Tamworth Comeback."

Opinion differs as to whether a Berkshire sow should be mated with a Tamworth boar, or *vice versa,* to produce breeding sows for bacon purposes, excellent results having been obtained by each method. The writer prefers the Berkshire boar being mated with a Tamworth sow. This cross yields an early maturing pig. The sows are prolific, good mothers, and suited to conditions in this State, and in the opinion of bacon curers produce a carcase required by the trade.

In grade herds of various breeds, the pure-bred selected Berkshire boar is recommended for "grading up" and the production of bacon pigs.

A Pure Bred Tamworth Sow.



This type of sow, mated with Pure Bred Berkshire Boar, produces progeny suitable for both pork and bacon trades. Female progeny mated with an unrelated Pure Bred Berkshire Boar produce the ideal bacon pig.

It is also strongly recommended that, in using representatives of the above breeds, care should be taken to select animals of good type, particularly with the Berkshire boar being used to produce bacon pigs. This animal should show in his conformation as many of the desirable points as possible mentioned in the description of the carcase above, and must be pure bred, the only proof of which is registration in the Herd Book.

In order to produce standardisation within the pig industry, great importance is attached to the selection by the farmer of a suitable breed or cross, which principle is considered the foundation of the trade.

The above recommendation has been based on purely commercial considerations; and concentration on two breeds or crosses, which supply the demands of the market, is undoubtedly preferable to diversity.

SOME PARASITIC AND NON-PARASITIC CAUSES OF "EMPTY" OR "TIPPED" HEADS IN WHEAT.

H. A. PITTMAN, B.Sc.Agr.,
Plant Pathologist.

There are a number of different causes of the presence of "empty" or "white" heads in wheat crops at harvest time. In years with normal rainfall and normal climatic conditions the most serious are various kinds of root- and stem-attacking fungi, such as those causing the diseases known as "Take-all" (*Ophiobolus graminis*, Sacc.), "Root-rot" (*Wojnowicia graminis* (McAlp.) Sacc. & D.Sacc.), and "Foot-rot" (*Helminthosporium sativum*, Pammel, King and Bakke).* Frost during the flowering period, insufficient depth of soil, water-logging, water deficiency, insufficient mineral substances such as phosphoric acid, excessive wind action, and excess "salt," wood ashes, or "alkali" in the soil, may also cause the occurrence of more or less completely empty heads in wheat crops.

In very dry seasons like that just passed, "Take-all" and kindred diseases are usually at a minimum, and the chief cause of either "empty" or tipped" heads is a comparatively dry soil, combined with strong wind-action round about the time of development and flowering of the wheat heads in the spring.

WIND ACTION AS A CAUSE OF EMPTY AND TIPPED HEADS IN WHEAT.

Following abundant rains over almost the whole of the wheat belt in Western Australia during the winter months of the season 1929-30, the ensuing spring was unusually dry and characterised by more or less continuous, hot, drying winds. As a consequence, the much-hoped-for yield of 50,000,000 bushels did not eventuate, and at the present time the indications are that the total returns will be in the vicinity of little more than 38,000,000 bushels.† Early in November, after a spring unprecedented for dryness in many districts over a period of more than thirty years, the estimated yield stood at 35,000,000 bushels, but the unusual advent of

* The use of the terms "Root-rot" and "Foot-rot" in the restricted sense used throughout this article was suggested by W. M. Carne, formerly Economic Botanist and Plant Pathologist to this Department, in an article entitled "Root-rot and Foot-rot of Wheat" in the December issue of this Journal for 1927, page 483, as follows:—" . . . . . This article is intended to draw attention to two diseases somewhat resembling Take-all and often confused with it. One of these is due to *Helminthosporium sativum*, which causes the condition known as Foot-rot, and the other to *Wojnowicia graminis*, which also causes a foot-rot, but for which the term Root-rot is suggested. It must be understood at once that all three fungi cause a root or foot-rot disease, and the terms used are simply for convenient distinction." The article referred to has been freely used in the preparation of the latter part of this paper, and the suggestion re the restricted use of the terms "Root-rot" and "Foot-rot" adopted. —H.A.P.

† This is, nevertheless, a record harvest for the State, the highest previous yield having been 36,370,219 bushels from 2,998,523 acres in 1927-28. The highest previous acreage under wheat for grain was 3,343,530 acres in 1928-29, in which season 33,790,040 bushels were harvested.—H.A.P.

unexpectedly heavy downpours during that month revived many of the later-maturing varieties, and added several million bushels to the harvest. Owing to the special effort put forward by farmers on the occasion of the State's Centenary (1929), 3,509,010 acres were sown and the 50-million bushel yield was apparently not beyond the possibility of attainment, given a normally good season. That the failure to come within a reasonably close distance of the goal was due almost entirely to an unusually unfavourable spring and early summer, few will doubt. On the 17th October, 1929, when the writer was *en route* to the Experiment Farms at Merredin and Southern Cross, many of the crops in ear adjoining the railway line were little more than a foot in height from Spencer's Brook eastwards, instead of standing some 2½-3 feet high.

Much of the wheat was very obviously "tipped," i.e., the tips of the ears were whitened, under-developed and devoid of grain. (See Figs. 1 and 2.)

Fig. 1.—Wheat heads showing the effects of hot, drying winds, at, or about, the flowering period. The two outside heads are normal, all the others show a greater or less amount of injury by wind action. The two heads second from the right and left, respectively, are completely whitened and free from grain. *(Photo. by Author.)*

The whitish colour of the tips contrasted sharply with the rich green of the lower, grain-filled portions of the heads. Sometimes completely white heads were seen, and on examination these were always found to be quite empty. Not infrequently heads with the normal green colour showed a complete absence of grain on being opened. The damage, of all kinds, was often particularly marked in late-maturing varieties, such as "Yandilla King" and "Baroota Wonder Early," while early-maturing sorts, such as "Noongar," "Geeralying," or "Gluya's Early," usually did not suffer to anything like the same extent. At the Experiment Farms where early, mid-season and late varieties are grown for demonstration purposes, side by

side, the slightly affected early-maturing varieties frequently showed to great advantage alongside the more seriously affected mid-season or late kinds, especially in the "Date of Sowing" experiments where the mid-season and late-maturing varieties had been sown somewhat later than their ideal sowing dates.

The vast majority of the plants affected with "tipping" or "empty heads" were not affected with any such root and stem diseases as "Take-all," "Root-rot," and "Foot-rot," as a plant disease survey in the Field, and a study of specimens submitted to the writer at Head Office by anxious farmers for report, revealed that such diseases were at an absolute minimum, presumably owing chiefly to the hot, dry, conditions of the late winter and spring. Of the very numerous samples of wheat with "tipped" and "empty" heads sent in for diagnosis by farmers in such widely scattered areas as Trayning, South Kumminin, East Pithara, Walgoolan, Keane, Salmon Gums, Southern Cross, Koorda, Gutha, Bencubbin, Wongan Hills, Merredin, Winchester, Canna, Nukarni, Burracoppin, Tammin, Muckinbudin, Carani, Corrigin, Moulyinning and Bruce Rock, only two specimens were affected with "Take-all" (*Ophiobolus graminis*) and one with "Root-rot" (*Wojnowicia graminis*). All the other samples were extraordinarily clean and free from troubles at the root or base of the stem. As a matter of fact, taking the State as a whole, rarely have parasitic diseases of wheat been so little in evidence as during the past season.

While "tipping" was common on the heavy land (growing, say, "salmon gum" "morrell" and "gimlet") complete emptiness of the affected ears was the more usual manifestation of trouble on the lighter land or sand-plain (growing, say, stunted "mallee," stunted scrub, broombush, tamma and tussock rush), in spite of the frequently reiterated statement in the Press and elsewhere that in a bad season sand-plain usually gives the best returns. Plants growing on the sites of old anthills or along headlands frequently suffered severely. Crops on newly cleared, hastily prepared sand-plain were much more severely affected than where the land had been cleared for some years and had become more consolidated, and freer from air pockets caused by the ploughing-in of dead leaves, sticks, roots, branches and twigs in the clearing process. As an illustration of this, certain farmers in the Corrigin district obtaining 18 bushels per acre from their old sand-plain, obtained only 9 bushels per acre from the same variety grown under otherwise identical treatment on strictly comparable, newly-cleared land. In the same district in the 1928-9 season on newly-cleared once-fallowed sand-plain, a certain farmer obtained only 249 bags of "Nabawa" wheat from 200 acres. The wheat on the heavy land of the same farm was badly "tipped," while on the sand-plain the ears were almost entirely empty. Some weeks prior to harvesting the sand-plain crop had been estimated by experienced farmers to yield 12-15 bushels per acre.

On "stripping" or "harvesting" during the present season (1929-30), many farmers on both sand-plain and heavy country were greatly surprised to find that the yields were very much below their estimates formed sometime prior to harvesting.

CAUSE OF THE TROUBLE.

The type of "tipping" or "empty" head condition in wheat herein referred to would appear to be very largely due to the action of hot, dry winds in blowing through the crop, at, or about, the flowering period, and

causing a greater loss of water by transpiration ("evaporation") from the leaves than the root system can make good in the same time. The leaves, to save themselves from death, as it were, then draw water back, or cause it to be diverted, from the developing ears, with the result that a greater or less number of developing husks and male and female parts are killed and grain-formation is prevented. Unfortunately there can, of course, be

Fig. 2.—Wheat heads showing the effects of hot drying winds at, or about, the flowering period. The head on the extreme right is normal, that on the extreme left completely whitened and empty; all the others are "tipped," *i.e.*, whitened and free of grain for a greater or less portion of the terminal part of the head. (*Photo. by Author.*)

no replacement of parts in the heads, even though the weather conditions should become ideal from a plant-growth and -development point of view immediately thereafter. In some cases only a spikelet or two at the tip of the ear becomes affected, but in others the whole ear may be sucked dry by the almost parched leaves. Direct drying out of the delicate tissues by the hot winds no doubt often plays a part in the development of the condition. That it is, frequently, however, due more to the withdrawal (or withholding) of water from the ears by the leaves, than to direct drying out or scorching up of the delicate parts by the heat is rendered obvious by the fact that the writer has frequently opened up leaf-sheaths, which were themselves quite unaffected and bore normal leaf-blades, only to find that the as-yet-unexposed portions of the ears have been already more or less whitened and rendered sterile, while still protected in the leaf-sheaths from direct contact with external conditions. Often a whitened ear-tip would be

found just protruding from its encircling leaf-sheath. On opening up the sheath the injury was often apparent for many more spikelets down the ear. As a matter of fact, the writer formed the very strong impression from field observations that many of the heads had been irreparably damaged before any part of the ears ever protruded from the sheaths into contact with the external atmosphere. On the other hand it is not uncommon, especially on sand-plain, to find empty heads remaining green and normal-looking until close to the ripening period of the uninjured heads. In such cases direct killing of the male and female parts at flowering time by the hot, drying winds may be the most important causal factor.

CONTROL.

Apart from the recognised methods of good farming, it is difficult to see just what can be done to prevent the formation of "tipped" or "empty" heads in wheat crops under the influence of hot drying winds at or about flowering time, as the trouble is so closely linked up with adverse climatic conditions. From a study of the occurrence of the phenomenon in the field, and a close analysis of the numerous letters of farmers on the Departmental Files dealing with the trouble, several things clearly stand out. These have been mentioned above, but their reiteration will not be amiss here. They are:—

1. Complete emptiness of the ears is much more common on the light lands or sand-plains growing say, stunted "mallee," broom bush, tamma, stunted scrub, and tussock-rush than on the heavy "forest" country growing say, salmon gum, morrell and gimlet.

2. Newly-cleared, and especially hastily-prepared light-lands, are much more prone to the trouble than such soils after some years of cropping when the soil has become more consolidated. This is undoubtedly due to the fact that newly-cleared or hastily-prepared light-lands almost always contain large quantities of ploughed-in roots, branches and leaves. These lead to the formation of numerous air pockets in the soil. The looseness of the soil and the air pockets cause a reduced root development. When, then, a critical period occurs just prior to, or at, the time of flowering, the leaves are apt to lose more water to the winds in a given period than the root system can replace. The ears then have to suffer for the shortcomings of the roots. More damage occurs in a dry year than in a wet, because the surface soil in wet years contains much more moisture, and is more compacted. As the years go by and the roots, branches, etc., decay, and the soil becomes still more consolidated by the movement of the horses and machinery, better root development on the part of the wheat plants occurs and less trouble eventuates in the ears in critical periods.

3. Other things being equal, in very dry years varieties flowering early suffer less than those flowering later in the season.

From what has been said above, it is obvious that the following measures will all tend to reduce losses from wind action during or around the flowering period in seasons of below-average rainfall:—

1. Careful preparation and consolidation of light-lands by conscientious clearing, a good burn and frequent shallow cultivations with heavy implements before sowing to establish a firm seed-bed.

2. The growth of the earliest possible varieties suitable for the district.

3. The use of abundance of superphosphate so as to stimulate the development of the greatest possible rooting system, and lead to slightly earlier flowering.

4. Early and clean fallowing should be practised (quite apart from all other considerations such as the control of diseases like "Take-all," "Flag-smut," etc.) to conserve the greatest possible amount of moisture for the growth of the ensuing crop.

5. The seed of the varieties selected should be sown in the right amounts and at the right time. The correct dates for sowing and amounts of seed per acre for any variety in a given district can be ascertained by enquiry from the Superintendent of Wheat Farms at Head Office, or from the Manager of the nearest Experimental Farm. Boiling the situation down to its essentials the following points for control come out:—Good preparation of the seed bed, early fallowing, clean fallowing, the growth of early-maturing varieties, seasonable sowing, and abundant fertilizing with superphosphate. As stated above, however, these are simply the accepted modern precepts of good farming, so that the farmer who carries them out conscientiously can rest assured that he has done all that is humanly possible to prevent losses by wind action round about the period of development and flowering of the wheat heads.

CONFUSION OF WIND INJURY WITH FROST INJURY.

The occurrence of frost during the flowering of the crop is apt to cause a killing of the male and female parts and husks in various parts of the heads, with the result that the ears will be more or less empty of grain at harvest time. As all the flowers in a wheat ear do not normally mature at the same time, the effect of frost is usually to kill some flowers and husks without affecting others. With frost injury, therefore, some ears will usually be free of grain and have injured husks at the top, others at the base, and still others in the middle. Wind action, on the other hand, either kills *all* the flowers in a head, or affects a greater or less number *from the top down*. Frost injury is most common in low-lying situations, whereas wind injury in undulating country is most frequent on the tops or slopes of hills and not in the depressions. In practice there is usually little difficulty in distinguishing frost injury from wind injury, as, apart from anything else, a knowledge of the local climatic conditions during the critical period in the development of the ears generally provides a ready clue to the cause of the trouble.

CONFUSION OF WIND INJURY WITH "EMPTY" OR "WHITE" HEADS CAUSED BY PARASITIC DISEASES SUCH AS "TAKE-ALL," "ROOT ROT" OR "FOOT ROT."

Whereas plants whose ears have been injured by wind action are usually quite free from any discolouration or rotting at the base of the stem and roots, injury by "Take-all," "Root-rot" or "Foot-rot" can be readily diagnosed by the presence of more or less root-rotting and considerable black discolouration or brown staining at the base of the plants.

(See Fig. 3.) While these parasitic diseases are chiefly found in normal or over-wet seasons, wind injury, as shown above, is largely confined to the seasons of below-average rainfall. The chief distinguishing features and the control measures for "Take-all," "Root-rot" and "Foot-rot" are given below.

Fig. 3.—Showing root-rotting and blackening of the bases of stems and leaves of wheat plants attacked by "Take-all." (*Photo. by Author.*)

"Take-all" (Cause = *Ophiobolus graminis*).—Attacks usually in more or less rounded patches, or strips, of varying size. May kill seedlings or half-grown plants, or cause "whiteheads," that is, prematurely ripe heads without grain. The stem-bases show a black discolouration extending above the ground level and covering a length of stem of up to about two inches. The discolouration is partially superficial, and a black felt of fungal-growth can be scraped off the stem or the inner surfaces of the leaf bases surrounding it. Eventually the black fungal web which covers the base of the stem and lines the insides of the leaf-bases becomes thickly dotted with small rounded black bodies with short necks, which are the fruiting cases of the fungus.

Each case (*perithecium*) contains within it large numbers of fungus seed-structures (*spores*), grouped in bundles of eight in thin sheaths called *asci*. (See Fig. 4.) When mature, and the *perithecia* are moistened, the *asci* with their contained spores are forced out into the open. The *asci* then burst and set the spores in the bundles free. On germination the spores may attack any wheat, barley, rye, barley grass or other susceptible plants in the neighbourhood, and so continue the disease. In the absence of any suitable host, however, they soon die. So far as is known all our wheat varieties are equally subject to "Take-all," but specific information on the point is unavailable. Affected plants usually show considerable root-killing, and an unusually abundant development of woolly root hairs close to the stems. Grain is rarely produced by affected plants and, if so, is small and shrivelled.

"Take-all" may be found on all types of soil and in new or old, fallowed or non-fallowed land. It is most prevalent in warm, moist springs on old land sown down to wheat year after year. It is especially common with us in

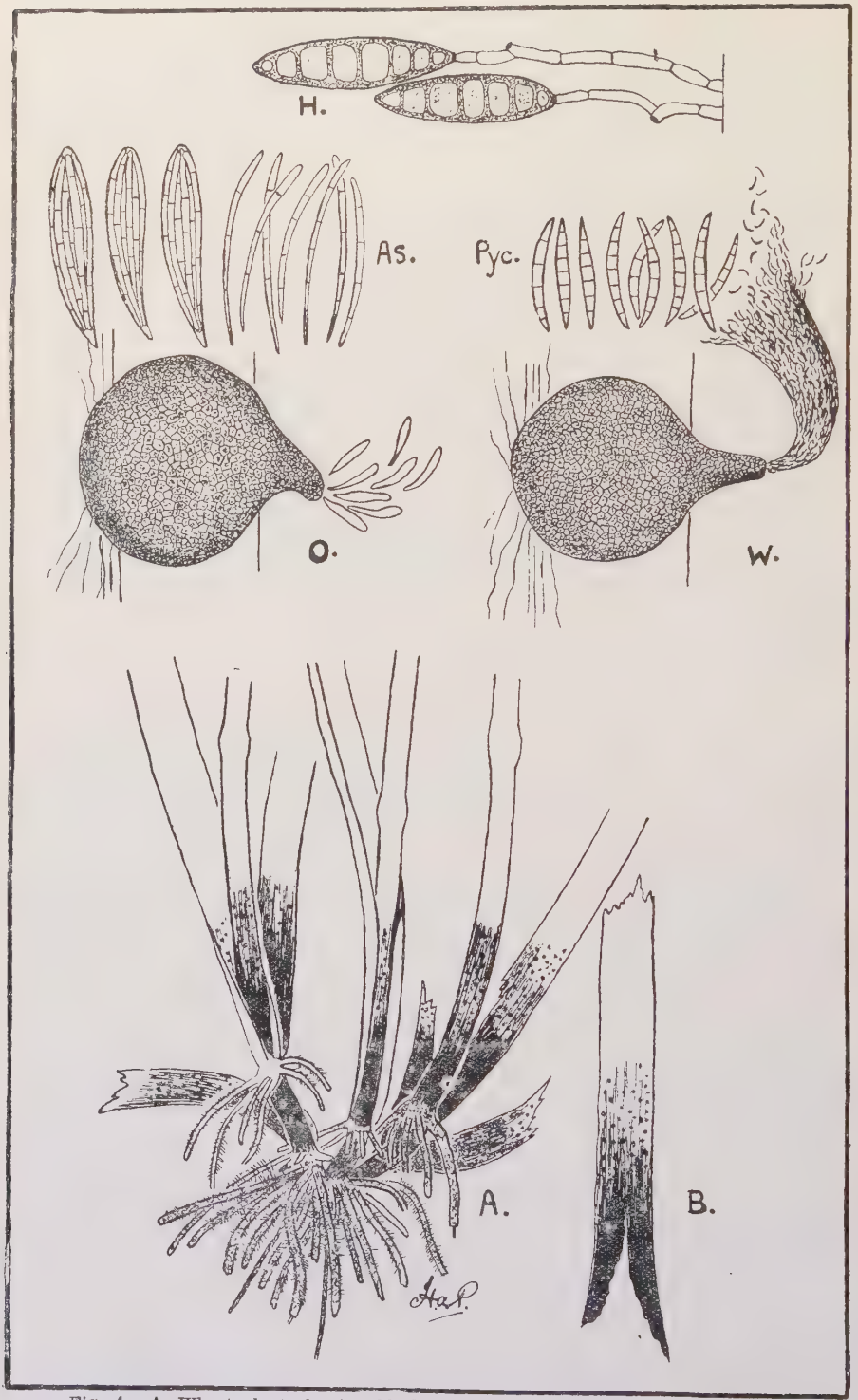


Fig. 4.—A. Wheat plant showing blackening at base of stems and inside the leaf-bases due to the "Take-all" fungus *Ophiobolus graminis*. B. Inner surface of leaf-base showing blackening and the fruiting bodies of *Ophiobolus graminis*. O. Fruiting case (*perithecium*) of *Ophiobolus graminis*, with escaping *asci*. W. Fruiting case (*pycnidium*) of *Wojnowicia graminis*. Pyc. Spores of *Wojnowicia graminis*. As. *Asci* and *Ascospores* of *O. graminis*. H. Spores of *Helminthosporium sativum*. **All drawings except A and B very much magnified.**

wet, poorly-drained places, and after a field has been allowed to grow up into grass. It is rare and need never be feared on intelligently farmed, well-drained properties, where early and clean fallowing, "wet sowing," abundant fertilizing, shallow planting, and crop rotation are practised as routine matters of farm management.

"Root-rot" (Cause = *Wojnowicia graminis*).—Though this parasite may attack wheat in patches, the patches are more irregular than in "Take-all," sometimes appearing as strips. In more typical cases affected plants are scattered through the crop, and this also occurs even when some of the affected plants are in patches. Both "Root-rot" and "Take-all" may occur together, which makes field identification more difficult. Though plants may be killed as seedlings or before heading, "Root-rot" is usually not noticed until "whiteheads" begin to show up in a crop If grain is formed, it is usually shrivelled. The stem discolouration is less marked than in the case of "Take-all," and varies from dark brown to black in colour. It is partially superficial, so that it may easily be mistaken for "Take-all." The discolouration is, however, usually in spots and streaks rather than generally distributed over the surface as in the latter disease.

So far "Root-rot" has only been found in Western Australia on wheat. It appears to be about as equally common as "Take-all" and both are not infrequently found on the same plants. It appears to be favoured by the same temperature and moisture conditions which favour "Take-all." The spores are produced in globular bodies much resembling those found in the case of *Ophiobolus*, but they differ in that they may be somewhat hairy, instead of smooth, and do not have the spores produced in bundles. (See Fig. 4.) The spores themselves also differ, as can be seen from the drawings.

"Foot-rot" (Cause = *Helminthosporium sativum*).—This disease is similar to "Root-rot" in its field occurrence and usually is first noticed when "whiteheads" appear in the crop. The stem discolouration takes the form of dark brown streaks, spots or patches. There is no superficial black fungal growth, and the affected parts of the stems do not usually extend above ground.

Plants may be killed out in all stages of development and the occurrence of "whiteheads" is a common symptom (Fig. 5). The fungus is fortunately only rarely found in Western Australia. It has a very wide host range and various strains may attack wheat, barley, rye, and many different grasses, including barley grass (*Hordeum murinum*) and various species of brome grasses (*Bromus spp.*). Oats have not so far been found affected in W.A., although some varieties are slightly affected in other parts of the world. In this State the disease has so far only been found on wheat. Susceptible species may be attacked on the roots, stems, leaves, ears, and grains. The disease is most serious under rather high soil temperatures, and in the presence of abundant moisture.

CONTROL OF "TAKE-ALL," "ROOT-ROT" AND "FOOT-ROT."

The control measures for the three diseases are sufficiently similar to be considered identical from a practical point of view. Where conscientiously carried out little loss need be feared from any of the three over a series of years, although once they have become established on a farm there

may be an appreciable loss in seasons very favourable for infection. The control measures are:—

1. *A good, clean, stubble-burn in badly-affected patches or paddocks.* Where only small patches occur, straw from the neighbouring healthy areas should, if possible, be distributed over the diseased areas before firing, so as to make a more intense burn over the badly affected patches. Where the disease is serious there is, of course, only a limited amount of stubble

Fig. 5.—Showing wheat plants that have died of "Foot-rot," due to *Helminthosporium sativum*, in various stages of development.

(Photo. Department of Agriculture, N.S.W.)

formed, so that the necessity for some additional material for burning is obvious. The object of a stubble-burn is to destroy as much as possible of the diseased roots and the lower parts of the infected stems and leaves. These are the parts which carry the fungi. The latter do not die with the

plants but live in *spore* (seed-like) form in the dead wheat tissues. If not burnt, the infected parts of the stubble will be blown about the paddock and into other paddocks, especially if broken up by the trampling of sheep and horses. The headlands should also be burnt to destroy self-sown wheat or barley plants, barley grass, brome grasses, silver grass (*Festuca bromoides*), etc., which may be harbouring "Take-all" or "Foot-rot."

2. *Early fallowing.* Unfortunately, a stubble-burn does not destroy all the affected stem-bases, leaf-bases or roots, so that a burn is not sufficient in itself to effectively control these diseases. It is therefore necessary to follow up the stubble-burn by early ploughing in the late autumn or early winter, if possible, so as to turn the spores under into the moist soil. This does not cause them to rot, as might be supposed, but induces many to germinate. If the first ploughing is left till the spring the soil may be too dry to induce copious germination, and many of the spores may not germinate till the following winter, thus putting back the control of the diseases for another year. Once the spores have germinated they must find something to attack or die of starvation. This brings us to the third point in the control measures, viz.:—

3. *Clean fallowing.* If ploughed in the early winter or late autumn, or even if left unploughed till the spring, the winter rains will have induced a more or less plentiful growth of self-sown wheat, barley grass, brome grasses, silver grass and perhaps barley. These plants may be attacked by the spores already ploughed in, and in such a case, unless the plants are killed out by clean cultivation, the fungi will eventually form a new crop of spores. *Therefore the fallows should be kept free from all growth in the spring.* From July to November, in a cool, moist spring, or to October in more normal years, it is dangerous, from a disease point of view, for grasses to grow on infected fallows. After that the very high temperatures of the summer will usually prevent both the susceptible plants and the fungi developing.

4. *Rotation of crops.* In addition to the above measures, rotation with oats, peas, rape, lupins, clovers or any other suitable plants not belonging to the Grass Family will give another season for the spores in the soil to germinate and die. Oats are not affected by "Root-rot" or "Foot-rot" in Western Australia, and are to all intents and purposes immune from "Take-all." None of the other plants mentioned above are subject to any of the three diseases. After the rotation crop the paddocks should preferably be clean-fallowed before again coming back into wheat.

5. *"Wet-Sowing,"* i.e., sowing wheat after the commencement of the autumn rains, not before, when the season allows, gives any fungus spores that may still remain in the soil a further chance to germinate and die before the wheat is sown or germinates.

6. Abundance of superphosphate should be used and the seed should be sown about 1½ inches deep, if practicable, on a well-prepared firmly-compacted seed bed. It has been shown by Kirby in America (Cornell Uni. Agr. Expt. Sta. Memoir. 88, 1925) that although "Take-all" can be grown in artificial media with a wide range of acidity or alkalinity it prefers somewhat alkaline conditions. Superphosphate, having a somewhat acid reaction, tends to suppress the development of the "Take-all" fungus and in addition stimulates abundant root-development and increased resistance to disease on the part of the plants. The sowing of wheat on a properly consolidated seed bed also stimulates vigorous root development, and by giving the plants a good start in life tends to render them more resistant to the inroads of the fungous diseases herein discussed. The seed should

be sown about 1½ inches deep, as if planted deeper considerable time and energy is wasted by the young wheat seedlings in developing their permanent root system at the 1½-inch level. The occurrence of a long seedling stem segment between the seed and the point of development of the permanent root system at about the 1½-inch level, seems to favour attack on the plants by the various root- and stem-attacking fungi. Numerous specimens received at Head Office appear to have been first infected on the dead seedling stem segment between the seed and the 1½-inch level.

7. If cutting infected crops for hay, set the reaper and binder to cut not closer to the ground than three inches, so that diseased tissues will not be spread about the farm on the hay, chaff or in the droppings of animals.

When all the above practices have been carried out to the best of the farmer's ability, he must not forget that infected barley grass, brome grasses, silver grass, and various other grasses along the headlands, and in adjoining paddocks left in grass, are potential sources of infection to clean paddocks. *To let an infected area go to grass does not check the disease on that area. Rather it is liable to infect adjoining areas through infected fragments of the grasses being blown about by wind, or carried to them on the implements or by stock, etc.* (See Fig. 6.)

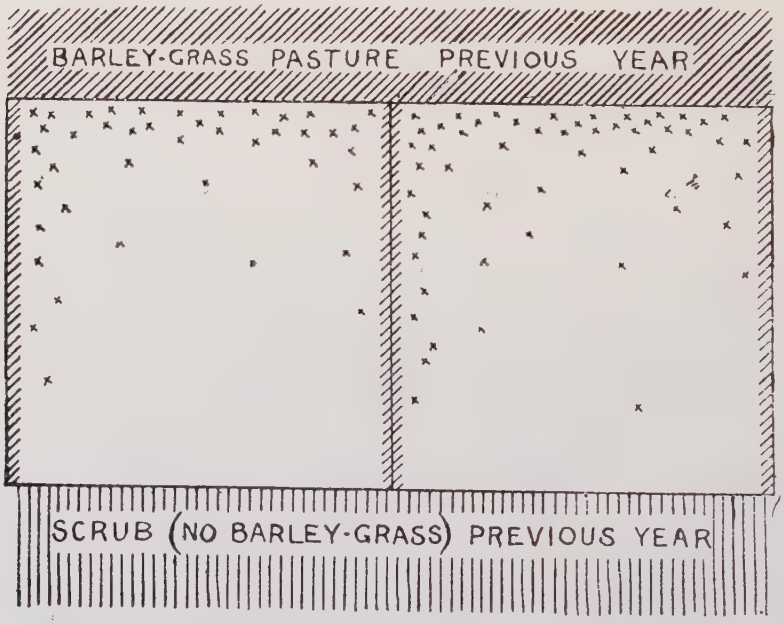


Fig. 6.—Diagram illustrating the manner in which two fields were affected with "Take-all." The crosses indicate the distribution of "Take-all" patches, but are not accurate plottings. (*After G. Samuel, "Take-all Investigations. 2." Journ. Dept. Agric. S. Aus., July,* 1924, *pp.* 1134-1147.)

If all the above recommendations are carried out conscientiously—and many of them are simply practices which should be carried out in the ordinary routine of good modern farming, quite apart from all considerations of disease—"Take-all," "Root-rot" and "Foot-rot" will be very greatly reduced in amount if not entirely eliminated from the wheat fields.

FIELD EXPERIMENTS WITH WHEAT, 1929.

YILGARN EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms,
and
G. K. STEVENS, Farm Manager.

The monthly rainfall as recorded at the farm for 1929 and 1928, together with the average for the past 40 years as officially recorded at Southern Cross, eight miles west of the farm, are set out below:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
1929 ...	36	120	50	...	275	145	57	25	9	60	571	294	...	1,071
1928 ...	92	...	62	50	170	76	165	89	48	7	555	...	57	816
Average 40 years	50	59	106	72	194	139	144	107	79	63	726	50	46	1,057

Of the 571 points which fell during the growing period, May to October, 48 points fell on the day on which harvesting of the grain crop commenced, and therefore this was not beneficial to the crops. Of the other precipitations which were recorded during the growing period, 420 points fell during the months of May and June, the balance of 103 points being spread over the four months July, August, September and October as compared with the average of 393 points for the same period. During the critical months of August and September 34 points only were recorded. The average for this period is 186 points. The previous year (1928) the rainfall for these two months was 137 points.

From these records it will be seen that with the exception of the excellent rains which were experienced during the months of May and June, resulting in even germination, the crops were grown under extremely adverse climatic conditions.

The land on which the experiments were carried out was cleared of salmon gum and gimlet timber in 1928/29, and except where otherwise stated was ploughed in July, 1929, with a disc implement and cultivated with a springtyne cultivator in September, twice after rain during the summer and again prior to seeding.

Time of Seeding Experiment.

The object of this experiment is to determine the most suitable month to plant the wheat crop.

Two varieties of different maturity were used—Nabawa, a midseason; and Gluyas Early, an early maturing variety.

The Nabawa plots were planted mid-April, May and June, and the Gluyas Early were planted mid-May, June and July.

The April sown plots did not germinate until after rain on the 1st of May. The other plots germinated immediately after planting.

The April and May plots of the midseason variety and the May plots of the early variety stooled well and made strong growth during the early part of the season.

The other plots, although good germination was obtained, made poor growth, particularly the Nabawa plots planted in June and Gluyas Early plots planted in July, the latter being very spindly, some plants not stooling at all.

YILGARN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Superphosphate (22%) 112lbs. per acre. Seed—42lbs. per acre.

Time of Seeding.	Computed Yields per Acre.					Average yields per acre 1929.	Percentage yields, 1929.	Average yields per acre 1928-29.	Percentage yields 1928–29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	%	bs. lbs.	%
April	12 25	11 5	12 55	11 56	13 24	12 21	123	16 41	105
May (Control) ...	9 59	9 38	10 43	9 30	10 29	10 4	100	15 50	100
June	4 52	5 28	6 5	5 14	5 28	5 25	54	8 32	54

YILGARN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Gluyas Early. Superphosphate (22%) 112lbs. per acre. Seed—42lbs. per acre.

Time of Seeding.	Computed Yields per Acre.					Average yields per acre 1929.	Percentage yields, 1929.	Average yields per acre 1928-29.	Percentage yields 1928–29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	%	bs. lbs.	%
June	4 52	5 6	5 50	5 36	6 5	5 30	59	9 30	63
May (Control) ...	10 14	7 48	9 8	7 48	11 34	9 18	100	14 59	100
July	1 42	2 26	2 33	2 12	1 20	2 3	22	4 15	28

Although these results are for one year only, they show the advisability of completing the planting of the wheat crop during the month of May, and they also indicate that there is an advantage in commencing to plant a mid-season variety in April.

Rate of Seeding Experiment.

The object of this experiment is to determine the most economic rate of seeding with (a) a midseason free stooling, and (b) an early and sparse stooling variety.

For the former the variety Nabawa, and for the latter the variety S.H.J. were used.

The germination on all plots was good. The lighter seeded plots appeared to have stooled better. Otherwise the general appearance of the plots was very even.

YILGARN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Planted on 27th April. Superphosphate (22%) 112lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.					Average yields per acre 1929.	Percentage yields, 1929.	Average yields per acre 1928-29.	Percentage yields 1928–29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	%	bs. lbs.	%
23lbs. per acre ...	12 55	11 56	12 33	11 20	11 12	11 59	97	16 34	101
45lbs. per acre (Control)	12 11	13 2	12 25	11 34	12 25	12 19	100	16 26	100
33lbs. per acre...	11 56	13 24	10 14	10 7	11 29	11 26	93	15 50	96

YILGARN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—S.H.J. Planted on 21st May. Superphosphate (22%)—112lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.					Average yields per acre 1929.	Percentage yields, 1929.	Average yields per acre 1928-29.	Percentage yields 1928–29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	%	bs. lbs.	%
23lbs. per acre ...	7 41	6 49	6 56	6 27	6 41	6 55	109	10 43	105
45lbs. per acre (Control)	6 12	6 56	6 19	5 43	6 34	6 21	100	10 14	100
33lbs. per acre...	6 12	6 49	6 41	6 49	7 11	6 44	106	10 36	104

These results being for two years only, no definite conclusion can be drawn. However they appear to indicate that there is no advantage to be gained by heavy rates of seeding.

Time of Application of Superphosphate Experiment.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be profitable to apply part or whole of the amount when cultivating the fallowed land during the late summer and early autumn.

For the purpose of the experiment, three plots were required.

Plot 1 received 75 lbs. in March and 150 lbs. at seeding.

Plot 2 was treated as control and received the whole 225 lbs. in March.

Plot 3 received 150 lbs. in March and 75 lbs. at seeding.

YILGARN EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Gluyas Early. Planted 9th May. Seed—42lbs. per acre.

Time of Application of Superphosphate.	Computed Yields per acre.					Average yields per acre 1929.	Percentage yields 1929.	Average yields per acre 1928-29.	Percentage yields 1928-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
75lbs. in March, 150lbs. at seeding	8 17	6 41	6 41	6 27	5 14	6 40	137	15 36	113
225lbs. in March	4 1	5 36	4 30	5 14	4 59	4 52	100	13 46	100
150lbs. in March, 75lbs. at seeding	5 58	7 19	4 37	4 23	8 17	6 7	125	14 51	108

The results confirm those of last year and indicate that the yields are decreased when portion of the fertiliser is not applied at seeding time.

Rate of Application of Superphosphate Experiment.

The object of this experiment is to determine the most economical rate to apply superphosphate to the wheat crop.

The experiment was commenced at this farm the previous year when three plots were used, and the rates of fertiliser compared were 75 lbs., 150 lbs., and 225 lbs. per acre.

This year the number of plots was increased so as to include plots receiving no fertiliser and 300 lbs. respectively. In order to maintain the three-plot system the experiment was divided into two sections.

In the first section plot No. 1 received no fertiliser; No. 2, 150 lbs.; and No. 3, 75 lbs.

In section two, plot No. 1 received 225 lbs.; No. 2, 150 lbs.; and No. 3, 300 lbs. In both sections the plot receiving 150 lbs. of superphosphate was treated as the control plot.

All plots made vigorous growth during the early part of the season, but were seriously affected during the latter part of the season. The plots receiving the heavier applications matured more rapidly.

YILGARN EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, NO. 1, 1929.

Variety—Gluyas Early. Planted 9th May. Seed—42lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
300lbs. per acre ...	4 23	5 43	4 45	3 39	5 43	4 51	65
150lbs. per acre (Control)	6 41	7 19	7 26	6 19	9 30	7 27	100
225lbs. per acre ...	6 12	5 28	4 37	5 50	7 48	5 59	80

YILGARN EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, No. 2, 1929.

Variety—Gluyas Early. Planted on 9th May. Seed—42lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
No superphosphate	7	33	7	41	5	36	6	5	5	28	6	29	58
150lbs. per acre (Control)	11	56	12	4	10	7	11	5	10	58	11	14	100
75lbs. per acre ...	10	51	10	58	9	59	9	52	10	7	10	25	93

The results are for one year only and no definite conclusions can be arrived at. They indicate, however, that the yields are increased when rates of superphosphate in excess of 75 lbs. and up to 150 lbs. per acre are used.

Nitrogen Experiment.

The objects of this experiment are:—

1. To determine whether increased yields are obtained when heavy dressings of sulphate of ammonia are applied to the wheat crop in addition to an application of superphosphate.

2. To ascertain whether it is advantageous to apply only part of this nitrogenous fertiliser at seeding time and part during the month of August.

For the purposes of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre, and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwts. of sulphate of ammonia respectively. With each of these dressings the whole of the fertiliser was applied at the one time, viz., at seeding, in the one instance and also, in separate plots, the application of half of the sulphate was delayed until the month of August.

That portion of the experiment dealing with the application of 1 cwt. of sulphate of ammonia was repeated three times, while that portion dealing with the 2 cwts. of sulphate per acre was duplicated.

This experiment was conducted on fallowed land, and throughout the growing period there was no apparent difference between the growths of the various plots.

The results obtained are tabulated hereunder:—

YILGARN EXPERIMENT FARM.

NITROGEN EXPERIMENT, 1929.

FALLOW.

Variety—Gluyas Early. Planted on 15th May. Seed 42lbs. Superphosphate (22%)—120lbs. per acre.

Treatment.	Computed Yields per Acre.					Average yields per acre 1929.	Average percentage yield, 1929.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.		
	b's. lbs.	b's. lbs.	b's. lbs.	b's. lbs.	b's. lbs.	bus. lbs.	
½ cwt. Ammonium Sulphate at seeding ½ cwt. Ammonium Sulphate in August	7 3	...	6 49	...	4 59	6 17	79
No Ammonium Sulphate (Control)	8 17	...	7 26	...	8 10	7 57	100
1 cwt. Ammonium Sulphate at seeding	8 25	...	7 19	...	8 54	8 13	104
1 cwt. Ammonium Sulphate at seeding 1 cwt. Ammonium Sulphate in August	...	7 11	...	6 49	...	7 0	93
No Ammonium Sulphate (Control)	...	9 1	...	6 5	...	7 33	100
2 cwt. Ammonium Sulphate at seeding	...	8 39	...	6 41	...	7 40	102

These results are for one year only and therefore no definite conclusions can be derived. The figures, however, indicate a sight increase in yield when a nitrogenous fertiliser is applied at seeding time. They also indicate that there is a decrease in yield when part of the nitrogenous fertiliser is applied during the spring. It is possible that this decrease is due to the burning or parching effect on the crop.

Seasonal Planting Experiment.

The objects of the experiment are—

(1) To ascertain the most suitable month to plant the Late, Midseason, Early and Very Early maturing varieties of wheat.

(2) To determine the most prolific of each of the above types.

To meet the requirements of this experiment three sections were needed, viz.:—

(a) Section 1, planted in April, representing Early planting.

(b) Section 2, planted in May, representing Midseason planting.

(c) Section 3, planted in June, representing Late planting.

Each section planted in its respective month was repeated five times, all plots being eventually harvested for grain.

The standard Midseason variety Nabawa was planted in the control plots in all sections.

April Planting.—The seed was planted in a dry seed bed and consequently it did not germinate until rain fell on the 1st of May. Germination was good and during the early part of the season all varieties made good growth, but were all affected by the adverse climatic conditions which prevailed during the latter part of the season. The varieties Baroota Wonder Early and Merredin were the first to show signs of distress. The very early variety Noongaar was the least affected. This variety came into ear in July and, as a useful rain was experienced immediately prior to this, it matured under more normal conditions than did other varieties.

YILGARN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

APRIL PLANTING.

Planted—15th April. Seed—42lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.					Average Yield, 1929.	Average Percentage Yield, 1929.	Average Percentage Yield, 1928-29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bs. lb.	bs. lbs.	bs. lbs.	bs. lb.	bs. lb.	bs. lb.	%	%
Baroota Wonder, Early	Midseason ...	7 41	5 14	5 36	5 21	5 6	5 48	42	...
Nabawa (Control)	Midseason ...	15 50	12 4	13 24	12 47	14 30	13 43	100	100
Canberra	Early ...	10 36	9 8	7 48	11 5	11 27	10 1	73	90
Gluyas Early ...	Early ...	14 0	12 25	11 5	13 2	17 3	13 31	104	97
Nabawa (Control)	Midseason ...	14 22	12 11	10 58	11 49	15 50	13 2	100	100
Merredin	Early ...	9 38	9 52	5 58	8 17	11 12	8 59	69	85
Carrabin	Early ...	13 24	13 24	9 38	11 12	14 0	12 20	99	...
Nabawa (Control)	Midseason ...	13 46	14 37	10 51	8 25	14 44	12 29	100	100
Noongaar	Very Early...	17 54	18 16	17 10	13 53	18 1	17 3	137	104

When perusing these results, it must not be overlooked that although the seed was planted on 15th April, it did not germinate until the first week in May.

In view of the scanty rainfall after the month of June, the results this year, as would be expected, are in favour of the very early maturing variety Noongaar.

In the light of past experience, however, in normal seasons it would be unwise to plant a very early maturing variety early in May owing to its liability to the disease Septoria. The varieties Baroota Wonder Early, Merredin and Canberra have not shown to advantage.

May Planting.—The seed was planted on an ideal seed bed and consequently the germination was excellent.

YILGARN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

MAY PLANTING.

Planted—15th May. Seed—42lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.					Average Yield, 1929.	Average Percentage Yield, 1929.	Average Percentage Yield, 1928-29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bs. lb.	bs. lb.	bs. lb.	bs. lb.	bs. lb.	bs. lb.	%	%
Baroota Wonder, Early	Midseason ...	3 10	3 24	2 33	3 46	2 12	3 1	34	...
Nabawa (Control)	Midseason ...	9 8	9 16	9 38	10 7	7 3	9 2	100	100
Canberra	Early ...	8 39	9 8	8 54	9 23	7 41	8 45	97	101
Gluyas Early ...	Early ...	13 2	11 34	10 58	11 34	9 45	11 23	118	109
Nabawa (Control)	Midseason ...	10 58	11 5	9 8	9 38	7 11	9 36	100	100
Merredin	Early ...	5 28	6 27	6 49	5 14	4 37	5 43	60	83
Carrabin	Early ...	7 48	10 7	9 52	8 25	5 58	8 26	93	97
Nabawa (Control)	Midseason ...	10 14	10 36	9 38	9 8	5 50	9 5	100	100
Geeralying ...	Very Early	11 20	10 58	10 14	9 23	6 19	9 37	106	105
S.H.J.	Early ...	9 38	8 39	8 32	9 8	7 26	8 41	87	83
Nabawa (Control)	Midseason ...	11 20	10 14	10 14	9 30	8 25	9 57	100	100
Noongaar	Very Early	15 7	13 53	14 37	13 9	12 25	13 50	139	116

These results are decidedly in favour of the standard early and very early maturing varieties, Gluyas Early and Noongaar. The variety Geeralying has also shown to advantage, whilst the varieties Baroota Wonder Early and Merredin, as was the case in the April planting, again showed at a disadvantage.

June Planting.—The germination on this section was irregular owing to the soil being of a heavy nature and inclined to set, and difficulty was experienced in maintaining the desired mulch. This affected all plots and in consequence all varieties were irregular in growth.

YILGARN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

JUNE PLANTING.

Planted—15th June. Seed—42lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.					Average Yield, 1929.	Average Percentage Yield, 1929.	Average Percentage Yield, 1928-29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bs lb.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	bs. lbs.	%	%
Baroota Wonder, Early	Midseason ...	2 19	1 35	1 20	1 57	†	1 48	40	...
Nabawa (Control)	Midseason ...	5 58	4 15	4 1	3 53	†	4 29	100	100
Canberra	Early ...	4 23	2 55	2 4	2 55	†	3 4	68	112
Gluyas Early ...	Early ...	5 14	4 30	3 24	4 15	†	4 20	89	116
Nabawa (Control)	Midseason ...	5 43	4 59	3 32	5 14	†	4 52	100	100
Merredin	Early ...	4 30	3 46	2 26	3 24	†	3 32	73	98
Geeralying ...	Very Early	3 53	2 55	2 55	3 46	†	3 22	69	104
Nabawa (Control)	Midseason ...	5 14	4 30	4 15	5 28	†	4 52	100	100
S.H.J.	Early ...	2 48	2 19	2 19	2 33	†	2 27	50	81
Noongaar	Very Early	4 15	2 55	3 24	2 48	†	3 21	77	144
Nabawa (Control)	Midseason ...	4 52	4 1	4 23	4 1	†	4 19	100	100

† Plots too uneven to be used for purposes of comparison.

The yields obtained from this section are considerably below those obtained from the earlier plantings. The results are for two years only but they indicate very forcibly the necessity for completing the seeding of the wheat crop in this district by the end of May.

The outstanding feature of this section is the fact that the standard midseason variety, Nabawa, has shown to advantage. This is not what may have been expected, as the seasonal conditions were more favourable to earlier maturing varieties.

FIELD EXPERIMENTS WITH WHEAT, 1929.

DAMPAWAH EXPERIMENT FARM.

I. Thomas, Sperintendent of Wheat Farms,
and
F. Gishubl, Farm Manager.

The farm is situated 30 miles east of Perenjori, being formerly a portion of Karara Station, held leasehold by K. Samson and Co., on the fringe of the Lower Murchison.

The soil is a red friable loam, and the area cropped last season was originally timbered mainly with York Gum, Giant Mallee, Karara, and Mulga scrub.

The clearing of the land under crop this season was completed in March, 1928. It was ploughed 3-4 inches deep during late June, July and August with an 8-disc cultivating plough. Immediately after ploughing it was cultivated with a springtyne cultivator, harrowed in January and again in February after thunderstorms. This gave a good even mulch and assisted to consolidate the subsoil.

The total rain recorded for the year (January-December) was 1,095 points. This compares favourably with the official records at Perenjori for the same period.

The following table shows the monthly falls and the number of days on which rain was recorded compared with the period for which records have been kept at the farm (since May, 1928):—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1929 ...	17	220	64	...	267	234	60	62	18	33	674	120	...	1,095
No. of days on which rain fell	1	6	2	...	13	15	7	6	2	2	45	6	...	60
1928 ...	...	...	...	...	164	94	238	142	71	34	743	6	156	...

All the crops made rapid and strong growth until the middle of August. It will be seen from the above table that the rains during July and August were scanty.

The adverse conditions continued throughout September, and as no serviceable rain was experienced during that month the crops were seriously affected and commenced to burn off in patches. It was feared at the time that the yields would be affected even to a greater extent than was actually the case.

Rate of Seeding Experiment.

The object of this experiment is to ascertain the most economical rate at which to plant the wheat crop with—

(a) a midseason, free stooling variety;

(b) an early, sparse stooling variety.

To meet the requirements of the former the standard variety Nabawa was used, and for the latter the variety S.H.J.

Each variety, treated as a separate experiment, was planted in different sections.

DAMPAWAH EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa Planted on 18th April. Superphosphate (22%)—108lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
30lbs. seed per acre	14	0	13	53	14	0	14	37	13	24	13	59	110
45lbs. seed per acre	12	11	12	47	13	2	12	33	13	9	12	44	100
60lbs. seed per acre	11	27	12	4	12	47	11	12	13	2	12	6	95

DAMPAWAH EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—S.H.J. Planted on 18th April. Superphosphate (22%)—108lbs. per Acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
30lbs. seed per acre	14	15	13	31	14	15	13	53	14	22	14	3	102
45lbs. seed per acre	14	0	12	40	14	8	13	53	14	8	13	46	100
60lbs. seed per acre	13	9	12	55	12	11	13	9	14	8	13	6	95

These results, which are for one year only, cannot be taken as conclusive. However, they confirm the results obtained at the other experiment farms, viz., that no advantage is obtained from the heavy rates of seeding.

Time of Application of Superphosphate Experiment.

This experiment was designed to determine whether when heavy dressings of superphosphate are used it would be profitable to apply part or all of the fertiliser when cultivating the fallowed land during late summer or early autumn, so that seeding operations can be expedited.

The results for this season are as follow:—

DAMPAWAH EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Gluyas Early. Planted on 6th May. Seed—44lbs. per acre.

Time of application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
75lbs. in April; 150 lbs. at Seeding time	19	44	22	47	23	2	23	23	24	7	22	37	106
225lbs. in April ...	20	28	21	41	21	12	21	41	21	34	21	19	100
150lbs. in April; 75 lbs. at Seeding time	21	41	22	54	22	40	23	2	20	57	22	15	104

Although for one year only, these results are in accord with the results from other Experiment Farms, and indicated that the wheat yields are decreased when a portion of the fertiliser is applied some time prior to seeding.

Rate of Application of Superphosphate Experiment.

This experiment is divided into two sections in order to test the effects of applying the following amounts of superphosphate per acre:—

Section 1.—300 lbs. per acre.
150 lbs. per acre (Control).
225 lbs. per acre.

Section 2.—No super.
150 lbs. per acre (Control).
75 lbs. per acre.

The results confirm the findings at other experiment farms, namely, that amounts of superphosphate in excess of 75 lbs. and up to 150 lbs. per acre can profitably be applied.

DAMPAWAH EXPERIMENT FARM.

RATE OF SUPERPHOSPHATE, EXPERIMENT NO. 1, 1929.

Variety—Gluyas Early. Planted on 6th May. Seed—44lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
300lbs. per acre ...	23	45	22	10	21	49	20	28	19	7	21	28	102
150lbs. per acre ...	22	40	21	12	21	12	21	5	18	45	20	59	100
225lbs. per acre ...	22	32	21	27	20	21	20	50	18	38	20	46	99

DAMPAWAH EXPERIMENT FARM.

RATE OF SUPERPHOSPHATE, EXPERIMENT NO. 2, 1929.

Variety—Gluyas Early. Planted on 7th May. Seed—44lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
No superphosphate	5	21	5	58	7	26	7	55	8	3	6	57	33
150lbs. per acre (Control)	20	28	20	36	21	34	21	5	20	21	20	49	100
75lbs. per acre ...	17	32	17	54	18	30	19	37	18	9	18	20	88

Nitrogen Experiment.

The objects of this experiment are—

1. To determine whether increased yields are obtained when heavy dressings of a nitrogenous fertiliser are applied to the wheat crop in addition to an application of superphosphate.
2. To ascertain whether it is advantageous to apply only part of the nitrogenous fertiliser at seeding time and part during the month of August.

For the purposes of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre, and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwts. of sulphate of ammonia respectively. With each of these dressings the whole of the fertiliser was applied at the one time, viz., at seeding, in the one instance, and also, in separate plots, the application of half the sulphate was delayed until the month of August.

That portion of the experiment dealing with the application of 1 cwt. of sulphate of ammonia was repeated three times, while that portion dealing with the 2 cwt. of sulphate of ammonia was duplicated.

This experiment was conducted on fallowed land, the results being tabulated hereunder:—

DAMPAWAH EXPERIMENT FARM.

NITROGEN EXPERIMENT, 1929.

Fallow.

Variety—Gluyas Early. Planted on 9th May. Superphosphate (22%)—120lbs. per Acre.
Seed—44lbs. per Acre.

Treatment.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
½ cwt. Ammonium Sulphate at Seeding; ½ cwt. Ammonium Sulphate in August	19 14	...	18 30	...	19 44	19 9	98
No Ammonium Sulphate (Control)	19 44	...	19 0	...	19 44	19 29	100
1 cwt. Ammonium Sulphate at Seeding	19 44	...	18 45	...	18 45	19 5	98
1 cwt. Ammonium Sulphate at Seeding; 1 cwt. in August	...	18 30	...	21 27	...	19 58	101
No Ammonium Sulphate (Control)	...	18 45	...	20 57	...	19 51	100
2 cwts. Ammonium Sulphate at Seeding	...	20 14	...	19 44	...	19 59	101

These results being for one year only are not conclusive, but they indicate, as do those at the Merredin and Yilgarn farms, that little or no advantage is obtained by applying a nitrogenous fertiliser to a wheat crop on fallowed forest land in the more Eastern wheat belt.

Mulching Experiment.

This experiment is conducted in order to determine how far and under what conditions the cultivation of winter fallowed land is profitable during the spring and summer months.

Three plots were necessary to fulfil the requirements of the experiment. They were treated as follows:—

Plot No. 1.—Cultivated during spring, again when required during summer after 25 points of rain or over, and again prior to seeding, the object being to maintain a mulch throughout the fallowed period and to destroy weed growth.

Plot No. 2.—Cultivated during spring and prior to seeding only (ordinary fallow).

Plot No. 3.—Cultivated prior to seeding only (neglected fallow).

The soil on which the experiment was conducted was a red friable loam, the original timber being York Gum and Karara. This land was fallowed and cropped for the first time for this experiment.

All the plots were fallowed at the end of June, 1928, and subsequently received the following cultivations with a springtyne implement.

Plot No. 1.—Cultivated in September, October, December, January, February, March, and prior to seeding in May.

Plot No. 2.—Cultivated in September and before seeding.

Plot No. 3.—Cultivated before seeding only.

The results obtained this season are as follow:—

DAMPAWAH EXPERIMENT FARM.

MULCHING EXPERIMENT, 1929.

Variety—Gluyas Early. Planted on 4th May. Superphosphate (22%)—112lbs. per acre. Seed—44lbs. per acre.

Treatment.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Mulched before Seeding only	22	54	22	3	20	50	22	18	21	56	22	0	100
Mulched in Spring and before Seeding	22	40	22	10	22	3	19	59	22	40	21	54	100
Mulched in Spring after rain, during Summer and before planting	20	21	20	43	20	50	21	5	22	32	21	6	96

Although Plot No. 1 received five additional workings the results are no better than those from the plot worked after ploughing and before seeding only. However, the results are only for one year and cannot as yet be accepted as conclusive.

Experiments were also planted for the purpose of ascertaining the most suitable months to plant the wheat crop and also to ascertain the most prolific of the different maturing types of wheat.

It is to be regretted that the birds (galahs) so damaged the plots that the results cannot be taken for comparison.

FIELD EXPERIMENTS WITH WHEAT, 1929.

CHAPMAN EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms, and
P. JEFFERY, Farm Manager.

The land on which the experiments were conducted varied from typical jam (acacia acuminata) country to that of lighter timber country and had been cleared some years previously.

The following table shows the monthly rainfall as recorded at the farm during the year, together with the averages for the past 24 years:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total. May-Oct.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.				
1929	40	20	10	424	643	189	190	73	35	1,554	106	3	1,663
Previous 24 years average	28	50	68	42	231	427	407	263	170	96	1,592	25	28	1,645

The seasonal rains commenced early in May, and during that and the following month the rainfall was considerably above the average for that period. The rainfall for the remaining months of the growing period, however, although below the average was sufficient for the crop to mature normally on account of the previous excessive rain.

All the experiments, unless otherwise stated, were planted on land which had been ploughed during the previous winter months (June, July and August) and was cultivated during September and October, again in March and prior to seeding.

Time of Seeding Experiment.

This experiment was commenced in 1923 and has been planted each year since with the early variety Gluyas Early, but owing to the plots being destroyed by fire in 1924 and other factors interfering with the results in 1925 and 1926, the results were not obtained for those years. Commencing in 1928, the midseason variety Nabawa was included in the experiment.

Each variety was planted as a separate experiment, the Gluyas Early being planted in mid-May, June and July, and Nabawa in mid-April, May and June.

The land was ploughed during August the previous year to a depth of 4 inches with a mouldboard plough and springtyne cultivated in September.

All the Gluyas Early plots were again cultivated when the May section was planted. The June and July plots received a further cultivation at the time the June section was planted, and the July plot was again cultivated prior to seeding.

The Nabawa plots were treated in a similar manner, that is, as each section was planted the remaining plots not planted were cultivated also. This insured the ground being free of weeds and in good tilth.

The soil was in a dry condition at the time of planting the April section of Nabawa. After the commencement of the seasonal rains, weed growth was most prominent. The May section was reasonably free, whilst the June section was free of weeds. The Gluyas Early plots were in a moist condition when planted.

The heavy rains during November caused the Gluyas Early plots planted in June to lodge slightly, whilst the July plots lodged badly. The May plots stood remarkably well. The following table shows the results obtained:—

CHAPMAN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Superphosphate (22%)—112lbs. per acre. Seed—45lbs per acre.

Planted.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Yields per acre 1928-29.	Percentage Yields, 1928-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	bus. lb.	%
April	7 55	8 17	8 32	7 11	7 3	7 28	73	9 45	86
May (Control) ...	11 20	10 29	10 58	10 21	10 14	10 40	100	11 20	100
June	11 49	12 25	11 12	10 51	*	11 34	108	10 43	95

* Discarded owing to an accident when planting.

CHAPMAN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Gluyas Early. Superphosphate (22%)—112lbs. per acre. Seed—45lbs. per acre.

Planted.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Yields per acre 1923-29.	Percentage Yields, 1923-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
June	14 51	15 50	13 53	14 22	13 24	14 28	76	13 46	80
May (Control) ...	15 57	20 14	20 14	20 6	18 45	19 3	100	17 10	100
July	7 3	6 49	8 3	6 12	7 41	7 10	38	8 54	52

The results of the sections planted with the early variety Gluyas Early confirm the previous year's result, and it can be definitely concluded that best returns can be expected when early varieties are planted in May.

The results of the section planted with the midseason variety Nabawa are for two years only, and therefore no definite conclusion can be arrived at. They indicate, however, that the May planting is the most suitable, but they do not agree with the results obtained last year from the April and June plantings. It must not be overlooked that weed growth in the April plots may have accounted for this, and it would appear advisable to await the seasonal rains before planting land on which weeds are troublesome.

Rate of Seeding Experiment.

This experiment is carried out with a sparse stooling variety, S.H.J., and a free stooling variety, Yandilla King, the object being to ascertain the most economical rate at which to plant the wheat crop.

The land was ploughed during August, 1928, with a mouldboard plough. Through the winter sheep had access to the paddock and kept down the weed growth. The land was cultivated with a springtyne implement in October and again prior to seeding.

The results for this year, together with the average results for the period 1923-29, are as follow:—

CHAPMAN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—Yandilla King. Planted on 6th May. Superphosphate (22%)—150lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.	Average Yields per acre 1923-29.		Percentage Yields, 1923-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lbs. per acre ...	8	32	7	55	7	55	7	11	8	25	8	0	112	15	29	100
45lbs. per acre (Control)	7	48	6	56	6	56	6	27	7	33	7	8	100	15	29	100
90lbs. per acre...	10	7	10	7	9	59	9	30	9	23	9	49	138	16	19	106

CHAPMAN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Hay Yields.

Planted on 6th May. Variety—Yandilla King. Superphosphate (22%)—150lbs. per acre.

—	Computed Yields per Acre.						Average Yields per acre 1929.		Percentage Yields, 1929.	Average Yields per acre 1923–29.		Percentage Yields, 1923–29.
	Section 1.		Section 2.		Section 3.							
	C.	Q. L.	C.	Q. L.	C.	Q. L.	C.	Q. L.	%	C.	Q. L.	%
60lbs. per acre ...	11	2 24	10	3 35	11	2 14	11	1 18	107	21	0 9	95
45lbs. per acre ...	11	0 4	10	0 21	10	3 17	10	2 23	100	22	0 14	100
90lbs. per acre ...	12	3 27	13	1 0	12	1 24	12	3 17	121	22	3 3	108

CHAPMAN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—S.H.J. Planted 8th June. Superphosphate (22%)—150lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.	Average Yields per acre 1923-29.		Percentage Yields, 1923-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lbs. per acre	19	44	20	21	20	28	21	12	22	3	20	46	99	16	48	105
45lbs. per acre...	19	44	20	57	20	57	21	12	21	27	20	51	100	15	57	100
90lbs. per acre...	18	30	20	6	20	6	20	43	20	14	19	56	96	17	17	108

CHAPMAN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Hay Yields.

Planted on 8th June. Variety—S.H.J. Superphosphate (22%)—150lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.			Average Yields per acre, 1929.	Percentage Yields, 1929.	Average Yields per acre, 1923-29.	Percentage Yields, 1923-29.
	Section 1.	Section 2.	Section 3.				
	C. Q. L.	C. Q. L.	C. Q. L.	C. Q. L.	%	C. Q. L.	%
60lbs. per acre ...	23 0 27	22 3 26	23 1 14	23 0 22	101	25 1 9	104
45lbs. per acre ...	22 3 26	22 3 11	22 3 3	22 3 13	100	24 1 18	100
90lbs. per acre	26 0 12	24 1 26	24 2 5	25 0 5	110	26 2 7	109

The results this year show that in the case of both the free stooling and the sparse stooling varieties, the hay yields are increased when the heavier rates of seed are sown.

Contrary to expectations the heaviest rate of seeding for the free stooling and late maturing variety Yandilla King gave a substantial increase in yield, whilst for the sparse stooling and early variety, S.H.J., the heavier rates show no advantage over the control of 45 lbs. per acre.

This is not in accord with the average results for the previous six years.

Time of Application of Superphosphate.

This experiment was commenced in 1928 with the object of determining whether, when heavy dressings of superphosphate are used, it would be economical to apply part or all of this fertiliser when cultivating the fallowed land during late summer or early autumn, thus enabling seeding operations to be expedited.

To suit the requirements of this experiment three plots were used and each section was repeated five times.

The land on which the experiment was conducted this year was ploughed with a heavy disc plough in June the previous year. It was cultivated with a springtyne cultivator during September, again in October and again in April when the fertiliser was applied, and also on the 14th May when the seed was planted.

The detailed results obtained this year, together with the average results for the two years the experiment has been in progress, are shown hereunder:—

CHAPMAN EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Nabawa. Planted on 14th May. Seed—45lbs. per acre. Superphosphate—225lbs. per acre

Time of Application of Superphosphate.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Yields per acre 1928-29.	Percentage Yields. 1928-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
75lbs. in April; 150lbs. at seeding time	12 33	14 8	13 24	14 51	14 22	13 52	103	14 30	109
225lbs. in April	14 30	13 9	12 55	12 25	14 37	13 31	100	13 17	100
150lbs. in April; 75lbs. at seeding time	13 53	12 11	12 18	11 49	13 17	12 42	94	13 38	103

The experiment has not been conducted sufficiently long enough for definite conclusions to be derived.

The results for this year show that the yields are increased when the greater portion of the superphosphate is applied at seeding time. The results for the two years, however, show that the yields are decreased when portion of the fertiliser is not applied at seeding time.

Rate of Superphosphate Experiment.

The object of this experiment is to ascertain the most profitable rates of superphosphate to apply to the wheat crop.

The previous year's trials were conducted with the rates 75 lbs., 150 lbs. and 225 lbs. per acre. This year the experiment was modified to also include plots receiving no fertiliser and 300 lbs. of superphosphate.

To meet the requirements, the experiment was designed so that the three plot system could be maintained. It was therefore divided into two sections, viz.:—

Section 1, consisting of three plots which received respectively 300 lbs., 150 lbs., and 225 lbs. of superphosphate per acre.

Section 2, consisting of three plots which received respectively no superphosphate, 150 lbs. and 75 lbs. of superphosphate per acre.

The results of the experiment are shown in the following tables:—

CHAPMAN EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, No. 1, 1929.

Variety—Nabawa. Planted on 14th May. Seed—45lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
300lbs. per acre ...	12	11	14	44	15	7	16	41	16	26	15	2	111
150lbs. per acre (Control)	11	12	14	0	13	31	14	37	14	59	13	34	100
225lbs. per acre ...	12	47	14	15	15	14	15	43	18	1	15	12	112

CHAPMAN EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, No. 2, 1929.

Variety—Nabawa. Planted on 14th May. Seed—45lbs per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
No Super.	7	11	8	54	8	10	8	3	8	3	8	4	71
150lbs. per acre (Control)	10	36	11	27	11	20	11	34	11	29	11	17	100
75lbs. per acre ...	9	1	9	1	9	59	10	29	9	52	9	40	86

As these results are for one year only, they cannot be taken as conclusive. They indicate, however, that the yields are increased by the heavier application of superphosphate.

It was not possible to conduct this experiment at this farm on land to which superphosphate had not been applied previously. Consequently the yields of the plots receiving no superphosphate this year would benefit by the residual effect of the superphosphate previously applied.

Nitrogen Experiment

The objects of this experiment are:—

1. To determine whether increased yields are obtained when heavy dressings of a nitrogenous fertiliser are applied to the wheat crop in addition to an application of superphosphate.
2. To ascertain whether it is advantageous to apply only part of this nitrogenous fertiliser at seeding time and part during the month of August.

For the purposes of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre, and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwts. of sulphate of ammonia respectively. With each of these dressings the whole of the fertiliser was applied at the one time, viz., at seeding, in the one instance, and also, in separate plots, the application of half of the sulphate was delayed until the month of August.

That portion of the experiment dealing with the application of 1 cwt. of sulphate of ammonia was repeated six times, while that portion dealing with the 2 cwt. of sulphate of ammonia was repeated four times.

This experiment was conducted on both fallowed and unfallowed land. The fallowed land was ploughed during June, 1928, and springtyne cultivated in September. During May, prior to seeding, it was again springtyne cultivated twice. The plots were planted on the 21st of May. Germination was good, and during the months of June, July and August the plots treated with the nitrogenous fertiliser made much better growth than the control plots.

The plots treated with the sulphate of ammonia turned colour about 5 or 6 days before the control plots, but all plots matured about the same time.

The unfallowed land was ploughed with a mouldboard plough about the middle of May, this operation being followed by a springtyne cultivation.

Throughout the early spring months the sulphate of ammonia plots made better growth than the controls, the highest dressing (2 cwts. per acre) showing to particular advantage. It was further noticed that the plots treated with the nitrogenous fertiliser flowered about 4 days earlier and turned colour about 15 days earlier than did the control plots. However, maturity was even throughout, due, perhaps, to the delay caused by the late rains.

The tabulated results are shown below:—

CHAPMAN EXPERIMENT FARM.

NITROGEN EXPERIMENT, 1929.

Fallow.

Variety—Nabawa. Planted 21st May. Seed—45lbs. per acre. Superphosphate—(22%)—120lbs. per acre.

Treatment.	Computed Yields per Acre.												Average Yields per acre 1929.		Average Percentage Yields, 1929.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.		Sec. 6.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
½ cwt. Ammonium Sulphate at seeding ; ½ cwt. Ammonium Sulphate in August	29	14	28	16	26	18	19	58	22	40	18	46	24	12	114
No Ammonium Sulphate (Control)	22	10	26	48	27	32	13	8	20	28	17	32	21	16	100
1 cwt. Ammonium Sulphate at seeding	28	16	27	32	27	32	17	48	22	24	19	58	23	55	112
1 cwt. Ammonium Sulphate at seeding ; 1 cwt. Ammonium Sulphate in August	27	16	28	0	...		21	42	20	28	...		24	22	109
No Ammonium Sulphate (Control)	27	16	27	46	...		17	4	17	32	...		22	25	100
2 cwts. Ammonium Sulphate at seeding	27	2	28	16	...		19	30	21	56	...		24	11	108

CHAPMAN EXPERIMENT FARM.

NITROGEN EXPERIMENT, 1929.

Non Fallow.

Variety—Nabawa. Planted on 21st May. Seed—45lbs. per acre. Superphosphate (22%)—120lbs. per acre.

Treatment.	Computed Yields per Acre.												Average Yield per acre 1929.		Average Percentage Yield 1929.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.		Sec. 6.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
½ cwt. Ammonium Sulphate at seeding ; ½ cwt. Ammonium Sulphate in August	17	18	16	34	17	3	21	41	19	59	13	38	17	42	105
No Ammonium Sulphate (Control)	18	2	13	24	15	7	20	43	19	0	14	22	16	46	100
1 cwt. Ammonium Sulphate at seeding	19	59	14	8	15	50	22	40	20	57	16	19	18	19	109
1 cwt. Ammonium Sulphate at seeding ; 1 cwt. Ammonium Sulphate in August	19	14	17	3	...		22	25	17	3	...		18	56	127
No Ammonium Sulphate (Control)	15	7	12	25	...		19	0	12	55	...		14	52	100
2 cwts. Ammonium Sulphate at seeding	20	14	17	47	...		23	23	22	10	...		20	54	141

These results, which are for one year only, and therefore not conclusive, indicate that a slight increase is obtained from non-fallowed land when 1 cwt. of nitrogenous fertiliser per acre is applied to the wheat crop at seeding time and a substantial increase when 2 cwts. are applied. However, this increase is considerably reduced if portion of either of these applications is delayed until the spring.

On the fallowed land the yield was increased to a greater extent by the 1 cwt. dressing than by the heavier dressing of 2 cwt. With both these dressings no advantage was gained by delaying portion of the applications until the spring.

Seasonal Planting Experiment.

The objects of this experiment are:—

1. To ascertain the most suitable month to plant the Late, Midseason. Early and Very Early maturing varieties of wheat.
2. To determine the most prolific of each of the above types.

To meet the requirements of the experiment three sections were needed, viz.:—

(a) Section 1.—Planted in April, representing early planting.
(b) Section 2.—Planted in May, representing Midseason planting.
(c) Section 3.—Planted in June, representing Late planting.

Each section planted in its respective month was repeated five times, all plots being eventually harvested for grain.

The standard midseason variety, Nabawa, was planted in the control plots in all sections.

April Planting.—The seed in this section was planted when the soil was in a dry condition, and consequently it did not germinate until after the seasonal rain commenced during the first week in May. At the time of planting the land was free of weed growth. With the first rain weed seeds germinated freely and in consequence interfered with the growth of the wheat crop, particularly the slow-growing late maturing variety, Yandilla King.

CHAPMAN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

April Planting.

Planted 16th April, 1929. Seed—45lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Average percentage yields, 1929.	Average percentage yields, 1928–29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Yandilla King ...	Late ...	10 36	8 17	6 12	7 3	7 48	7 59	65	81
Nabawa (Control)	Midseason	14 51	12 40	11 12	10 43	12 11	12 19	100	100
Baroota Wonder, Early	Late ...	13 53	12 11	12 11	12 40	13 38	12 55	105	101
Comeback ...	Early ...	11 42	9 59	9 1	8 17	11 27	10 5	104	...
Nabawa (Control)	Midseason	11 12	8 32	9 16	10 14	9 16	9 42	100	100
Gluyas Early ...	Early ...	11 42	8 54	8 17	9 23	8 3	9 16	96	98

With the exception of the Yandilla King, the results obtained this year and the average percentage results for the two years the experiment has been conducted do not show a great difference between the varieties.

May Planting.—The land at the time of planting was in excellent condition and was free of weeds. Germination was good.

The very early variety Noongar came into ear on the 15th of August and at harvest time had lodged badly.

CHAPMAN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

May Planting.

Planted 22nd May, 1929. Seed—45lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Average percentage yields, 1929.	Average percentage yields, 1928–29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Yandilla King ...	Late ...	16 48	14 0	14 30	14 59	19 30	15 57	93	93
Nabawa (Control)	Midseason	17 32	14 59	14 8	18 1	21 12	17 10	100	100
Baroota Wonder, Early	Late ...	16 41	15 43	15 29	19 0	20 50	17 33	102	97
Gluyas Early ...	Early ...	17 32	16 26	16 4	19 0	18 9	17 26	97	95
Nabawa (Control)	Midseason	18 9	15 43	17 17	19 0	19 59	18 2	100	100
Canberra ...	Early ...	20 14	18 1	18 45	21 12	21 19	19 54	110	102
Comeback ...	Early ...	15 43	13 46	14 8	16 4	19 0	15 44	88	...
Nabawa (Control)	Midseason	18 1	15 36	16 4	19 0	20 57	17 56	100	100
Merredin ...	Early ...	17 39	16 4	16 48	18 30	19 59	17 48	99	102
Carrabin ...	Early ...	15 36	15 36	15 43	18 9	19 37	16 56	98	99
Nabawa (Control)	Midseason	15 14	14 22	16 26	18 30	21 19	17 10	100	100
S.H.J.	Early ...	14 59	12 25	13 53	17 25	19 59	15 44	92	104
Geeralying ...	Very Early	13 24	14 15	16 34	19 0	20 14	16 41	95	92
Nabawa (Control)	Midseason	14 15	14 22	17 32	20 36	21 27	17 38	100	100
Noongaar ...	Very Early	10 36	10 43	10 29	10 29	11 5	10 40	60	79

It will be seen from both the average results for this year and the average percentage results that, apart from the very early variety Noongaar, there is not a great deal of difference between any of the varieties. This year the early variety, Canberra, has shown to advantage at this farm, but this advantage is not mantained in the average percentage results for the two years. In the latter results S.H.J. has a slight advantage.

June Planting.—At the time of planting this section weeds were plentiful and to destroy them it was found necessary to skim-plow the land with a mouldboard implement. It was also harrowed after planting to disturb them and prevent re-growth. Otherwise a good seed bed was obtained, and in consequence the germination was good. The heavy rains during November caused all varieties to lodge.

CHAPMAN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

June Planting.

Planted 18th June, 1929. Seed—45lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Average percentage yields, 1929.	Average percentage yields, 1928–29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Merredin ...	Early ...	19 14	17 32	14 30	12 18	7 19	14 11	103	90
Nabawa (Control)	Midseason	15 57	16 12	14 51	12 11	9 16	13 41	100	100
Canberra ...	Early ...	15 14	18 1	17 54	13 38	10 58	15 9	111	98
Gluyas Early ...	Early ...	13 24	15 21	14 22	11 34	10 7	12 58	103	92
Nabawa (Control)	Midseason	13 9	15 50	13 2	10 58	10 14	12 39	100	100
S.H.J.	Early ...	12 55	15 57	12 47	9 30	10 36	12 21	98	92
Geeralying ...	Very Early	14 8	16 4	12 33	7 55	10 36	12 15	98	88
Nabawa (Control)	Midseason	15 29	16 19	12 18	7 26	11 20	12 34	100	100
Noongaar ...	Very Early	14 15	14 30	9 1	7 3	10 21	11 2	88	90

It will be noticed in this year's results the early varieties have shown to advantage, whilst the very early variety Noongaar has not. The percentage results for the two years are slightly in favour of the midseason variety.

The results of the three plantings indicate that the month of May is the most suitable to plant the wheat crop, and where weeds are troublesome it is advisable to delay planting until after the seasonal rains commence.

SALMON GUMS EXPERIMENT FARM.

FIELD EXPERIMENTS WITH WHEAT, 1929.

(I. THOMAS, Superintendent of Wheat Farms, and L. G. SENIOR, Farm Manager.)

The area on which the experiments were conducted was cleared in 1926 and cropped in 1927 without fallow, and for the experiments conducted last year it was ploughed 3 to 4 inches deep with a disc implement during June and July, 1928. Included in the area was the type of soil locally known as "kopi," which physically is similar to the Morrel soil. This type is recognised as unsuitable for cropping when the rainfall is light.

Subsequent to the initial ploughing it was cross disced to destroy self-sown plants from the previous crop. This cross discing was also successful in dealing with mallee sucker growth. In January the heavier land was springtyne cultivated whilst the "kopi" soil was harrowed. Prior to seeding this cultivation was repeated with the same implement.

Although the Esperance wheat-growing area in which the farm is located did not experience the heavy rains in May and June as did other districts throughout the wheat belt, the rainfall was sufficient to ensure a good germination. Good conditions prevailed until the end of August, at which time the useful rains terminated. The land not having received sufficient heavy rains to penetrate well into the sub-soil, the reserves of moisture were limited and consequently by the end of September were suffering severely and eventually did not yield up to earlier expectations.

The following table shows the monthly rainfall for 1929 as recorded at the farm, together with the averages for the past 11 years as recorded at Salmon Gums, one mile distant.

—	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1929 at Experiment Farm	106	65	73	26	125	207	159	163	21	35	710	150	43	1,173
Average 11 years, Salmon Gums	31	50	112	106	154	152	135	131	115	126	813	81	81	1,274

TIME OF SEEDING EXPERIMENT.

The object of this experiment is to determine the most suitable time for planting the wheat crop.

Two varieties are used, the mid-season variety, Nabawa, being sown in April, May, and June, and the early variety, Gluyas Early, in May, June, and July.

The land on which the experiment was conducted was of a red loamy nature. It was ploughed during June and July, 1928, and cross ploughed in October. It was cultivated with a springtyne implement in January. Each plot was again cultivated immediately prior to seeding.

The results obtained are as follow:—

SALMON GUMS EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Seed—45lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Time of Seeding.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.	Average Yields, per acre, 1928-29.	Percentage Yields, 1928-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
April	11 20	11 27	11 27	12 40	13 9	12 1	93	13 24	108
May	12 11	11 5	12 11	12 11	17 3	12 56	100	12 25	100
June	4 45	4 59	5 6	7 3	9 1	6 11	48	6 19	51

SALMON GUMS EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Gluyas Early. Seed—45lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Time of Seeding.	Computed Yields per acre.					Average Yields per acre. 1929.	Percentage Yields, 1929.	Average Yields per acre, 1928-29.	Percentage Yields, 1928-29.
	Sec .1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
June	8 25	8 32	8 39	8 3	7 48	8 17	62	10 29	73
May	13 46	13 9	13 46	13 9	12 55	13 21	100	14 15	100
July	6 56	6 34	6 5	6 27	5 50	6 22	48	8 17	58

This experiment again demonstrates that the yields of both early and mid-season varieties are considerably reduced when the crop is planted later than the month of May.

RATE OF SEEDING EXPERIMENT.

This experiment is conducted to determine the most profitable rate of seeding the wheat crop.

Two varieties were used, "Yandilla King" representing the free stooling varieties, and "S.H.J." representing the sparse stooling varieties.

The land upon which the Yandilla King was planted was mainly "kopi" soil, somewhat inferior in quality to that upon which the S.H.J. was planted.

The plots were ploughed in June and July, 1928, and cross ploughed in October to destroy self-sown wheat plants. The S.H.J. section was cultivated with a springtyne implement and the Yandilla King section harrowed the last week in January and again just before seeding.

Germination was good.

The results obtained are set out below.

SALMON GUMS EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—Yandilla King. Planted on 17th April. Superphosphate (22%)—112lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.	Average Yields, per acre, 1928-29.	Percentage Yields, 1928-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lb	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
30lbs. per acre	3 29	4 59	4 52	4 52	8 25	5 19	82	10 14	98
45lbs. per acre	5 43	7 3	5 50	6 41	7 19	6 31	100	10 29	100
60lbs. per acre	6 12	4 59	6 41	7 55	8 32	6 52	105	10 58	105

SALMON GUMS EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—S.H.J. Planted on 17th April Superphosphate (22)—112lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.	Average Yields per acre, 1928-29.		Percentage Yields, 1928-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
30lbs. per acre	11	20	10	58	10	43	10	14	*		10	49	97	11	34	99
45lbs. per acre	10	58	11	34	10	51	11	12	*		11	9	100	11	42	100
60lbs. per acre	10	43	10	21	10	21	11	34	*		10	45	96	11	34	99

* Discarded owing to an error in drilling.

The results indicate that little or no advantage is derived from planting more than 45 lbs. of seed per acre.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

This experiment is conducted in order to determine whether, when applying heavy dressings of superphosphate, it would be profitable to apply part or all of the fertiliser when cultivating the fallowed land in late summer or early autumn, thus allowing seeding operations to be expedited.

The land upon which the experiment was planted was ploughed in June, 1928. It was cross ploughed in September and October to destroy self-sown wheat. It was cultivated with a springtyne implement in January and again immediately prior to planting.

The tabulated results for 1929, together with the averages for the years 1928-29, are as follow:—

SALMON GUMS EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Nabawa. Planted on 15th May. Superphosphate (22%)—225lbs. per acre. Seed—45lbs. per acre.

Time of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields 1929.	Average Yields per acre, 1928-29.		Percentage Yields, 1928-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
75lbs. at Seeding; 150lbs. in March	8	46	8	54	11	27	10	51	10	29	10	5	99	13	38	104
Nil at Seeding; 225lbs. in March	8	39	8	17	9	23	11	5	13	24	10	10	100	13	9	100
75lbs. in March; 150lbs. at Seeding	9	8	10	51	10	7	13	31	14	8	11	33	114	14	44	112

The average results for the two years the experiment has been conducted show that the yields are decreased when a portion of the fertiliser is not applied at seeding time.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

This experiment has been modified and is now divided into two sections. This allows of the introduction of a plot receiving no super and one receiving 300 lbs. per acre. The object of the experiment is to determine the most profitable amount of superphosphate to apply to the wheat crop.

The land upon which the experiment was conducted was of a red loamy nature. It was ploughed in June and July, 1928, and cross ploughed in October in order to get rid of self-sown wheat.

The results obtained are tabulated below:—

SALMON GUMS EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT NO. 1, 1929.

Variety—Nabawa. Planted on 12th May, 1929. Seed—45lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
300lbs. per acre ...	16 56	16 34	13 9	10 36	9 23	13 14	117
150lbs. per acre ...	15 7	14 59	9 16	9 8	8 17	11 19	100
225lbs. per acre ...	17 10	15 43	15 57	10 51	10 58	14 8	125

SALMON GUMS EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT NO. 2, 1929.

Variety—Nabawa. Planted on 14th May. Seed—45lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs	bus lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
No superphosphate	4 1	5 14	4 1	4 15	7 19	4 58	32
150lbs. per acre (Control)	15 57	14 59	16 48	16 34	13 46	15 37	100
75lbs. per acre ...	13 46	14 8	14 37	14 37	14 44	14 22	93

These results, which are for one year only, tend to indicate that dressings in excess of 75 lbs. may be applied with beneficial results.

NITROGEN EXPERIMENT.

The objects of this experiment are:—

1. To determine whether increased yields are obtained when heavy dressings of a nitrogenous fertiliser are applied to the wheat crop in addition to an application of superphosphate.

2. To ascertain whether it is advantageous to apply only part of this nitrogenous fertiliser at seeding time and part during the month of August.

For the purposes of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre and those plots to which superphosphate only was applied were treated as controls Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwts. of sulphate of ammonia respectively. With each of these dressings the whole of the fertiliser was applied at the one time, viz., at seeding, in the one instance, and also, in separate plots, the application of half of the sulphate of ammonia was delayed until the month of August.

That portion of the experiment dealing with the application of 1 cwt. of sulphate of ammonia was repeated three times, while that portion dealing with the 2 cwts. of sulphate of ammonia was duplicated.

This experiment was conducted on fallowed land which had been ploughed in June, 1928. It was cross ploughed in October to eradicate self-sown wheat, springtyne cultivated in January, 1929, and again immediately prior to planting.

The plots treated with the nitrogenous fertiliser made good growth until the dry spell in September, when they appeared to suffer worse than the control plots.

The results of the experiment are tabulated hereunder:—

SALMON GUMS EXPERIMENT FARM.

NITROGEN EXPERIMENT, 1929.

Variety—Nabawa. Planted on 16th May. Seed—45lbs. per acre. All plots received a dressing of 120lbs. of Super.

Treatment.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields per acre, 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
½ cwt. Ammonium Sulphate at Seeding; ½ cwt. in August	11 27	...	12 55	...	12 33	12 18	91
No Ammonium Sulphate (Control)	12 47	...	13 46	...	14 0	13 31	100
1 cwt. Ammonium Sulphate at Seeding	12 25	...	13 17	...	14 22	13 21	99
1 cwt. Ammonium Sulphate at Seeding; 1 cwt. in August	...	12 25	...	14 22	...	13 23	100
No Ammonium Sulphate (Control)	...	13 24	...	13 17	...	13 20	100
2 cwts. Ammonium Sulphate at Seeding	...	13 2	...	11 20	...	12 11	91

As the experiment has been conducted for one year only, no definite conclusions can be derived. However, these results indicate that the yield is not increased by the application of a nitrogenous fertiliser to the wheat crop on fallowed land.

SEASONAL PLANTING EXPERIMENT, 1929.

The objects of this experiment are:—

1. To ascertain the most suitable month to plant the Late, Mid-season, Early, and Very Early maturing varieties of wheat.

2. To determine the most prolific of each of the above types.

To meet the requirements of the experiment, three sections were made, viz:—

(a) Section 1, Planted in April, representing early planting.

(b) Section 2, Planted in May, representing mid-season planting.

(c) Section 3, Planted in June, representing late planting.

Each section planted in its respective month was repeated five times, all plots being eventually harvested for grain.

The Standard mid-season variety was planted in the control plots in all sections.

The land on which this experiment was conducted varied from red loam to the grey "kopi" soil. The April section was planted chiefly on the former, whilst the May and June sections were planted on the latter.

The April plots were planted on a dry seed bed and consequently the seed did not germinate until rain was experienced early in May.

Both the April and May plantings germinated and stooled well. Early growth was vigorous and gave promise of good returns until the end of September. At that time dry conditions prevailed and the crops suffered considerably.

The germination of the plots in the June section was not as good. The subsequent growth was very slow and patchy and, when mature, the crop was very poor and short.

The results obtained this year together with the averages for the two years the experiment has been conducted at this farm are set out below.

SALMON GUMS EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

April Planting.

Seed—45lbs. per acre. Superphosphate—112lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.					Average Yield per acre, 1929.	Average percentage Yield, 1929.	Average percentage Yield, 1928-29.
		Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Yandilla King ...	Late ...	7 33	10 7	10 51	7 3	6 49	8 29	74	83
Nabawa	Midseason ...	10 14	11 12	12 18	11 20	12 18	11 28	100	100
Baroota Wonder Early	Midseason ...	9 52	10 21	10 43	7 48	7 55	9 20	82	91
Canberra	Early ...	11 56	12 11	13 9	12 25	12 25	12 25	106	97
Nabawa	Midseason ...	10 29	11 42	12 33	11 56	11 42	11 40	100	100
Merredin	Early ...	10 51	11 56	12 47	10 51	11 20	11 33	99	86
Gluyas Early ...	Early ...	10 21	10 58	12 11	12 11	10 51	11 18	96	...
Nabawa	Midseason ...	10 43	11 12	13 9	11 42	12 18	11 45	100	100
Noongaar	Very Early...	7 48	9 45	9 38	10 14	8 10	9 7	77	...

SALMON GUMS EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

May Planting.

Seed—45lbs. per acre. Superphosphate—112lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yield per acre, 1929.	Average percentage Yields, 1929.	Average percentage Yields, 1928-29.
		Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Yandilla King ...	Late ...	5 36	4 23	4 37	2 48	2 12	3 55	42	70
Nabawa, ...	Midseason ...	10 58	9 30	10 7	7 3	8 39	9 15	100	100
Merredin	Early ...	10 43	10 43	9 45	7 26	9 59	9 43	105	...
Baroota Wonder Early	Midseason ...	5 14	4 52	3 46	3 10	4 23	4 17	49	63
Nabawa	Midseason ...	10 21	9 16	9 1	6 5	8 54	8 43	100	100
Canberra	Early ...	9 16	8 46	7 26	6 12	9 59	8 20	96	96
Gallipoli	Late Midseason	6 12	7 55	4 59	3 24	5 21	5 34	65	83
Nabawa	Midseason ...	9 30	10 7	8 3	4 59	10 7	8 33	100	100
Gluyas Early ...	Early ...	9 45	10 29	8 17	6 12	8 32	8 39	101	97
Carrabin	Very Early	7 48	9 30	7 41	6 34	7 33	7 49	99	94
Nabawa	Midseason ...	9 30	9 16	7 41	5 58	7 3	7 54	100	100
S.H.J.	Very Early...	8 3	8 17	6 34	5 14	8 3	7 14	92	92
Geeralying ...	Very Early ...	8 3	8 39	6 49	5 21	7 11	7 13	95	97
Nabawa	Midseason ...	9 16	9 1	6 49	4 52	8 3	7 36	100	100
Noongaar	Very Early...	8 3	10 7	7 26	5 50	9 30	8 11	108	105

SALMON GUMS EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

June Planting.

Seed—45lbs. per acre. Superphosphate—112lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.					Average Yields per acre, 1929.	Average percentage Yields, 1929.	Average percentage Yield, 1928-29.
		Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Yandilla King ...	Late ...	3 53	3 46	3 17	5 50	4 8	4 11	89	...
Nabawa	Midseason ...	3 24	4 59	3 24	6 41	5 6	4 43	100	100
Canberra	Early ...	5 36	4 59	4 15	7 26	5 36	5 34	118	111
Baroota Wonder Early	Midseason ...	3 24	2 55	2 40	5 6	3 24	3 30	69	...
Nabawa	Midseason ...	4 59	4 37	4 15	7 3	4 45	5 8	100	100
Gluyas Early ...	Early ...	6 27	5 50	6 5	8 3	6 41	6 37	129	113
S.H.J.	Very Early ...	4 23	4 52	4 45	6 49	5 14	5 13	102	87
Nabawa	Midseason ...	5 14	5 14	4 30	6 27	4 15	5 8	100	100
Merredin	Early ...	5 14	5 14	4 45	6 41	6 27	5 40	112	109
Geeralying ...	Very Early...	5 28	5 21	5 36	6 34	6 56	5 59	115	104
Nabawa	Midseason ...	4 59	4 59	3 53	5 50	6 12	5 11	100	100
Noongaar	Very Early...	6 12	6 27	7 41	8 3	9 30	7 33	146	119

In all three sections there is not a great difference between the yields obtained from the standard mid-season variety and those obtained from the early and very early maturing varieties in their respective plantings, except in the case of the early variety, Noongaar, planted in April.

In view of past experience elsewhere, however, when the yields of the early maturing varieties planted in April have been reduced almost to failure in some instances, by the disease Septoria, which is due to the crop being planted too early and maturing out of season, it is inadvisable to commence planting these early varieties before the first week in May.

This year, owing to the absence of spring rains, the season was more favourable for the normal maturity of the early varieties. As the mid-season variety has, up to the present, shown its suitability for April planting, it is recommended for early planting in this district.

FIELD EXPERIMENTS WITH WHEAT AND OATS, 1929.

MERREDIN EXPERIMENT FARM.

I. Thomas, Superintendent of Wheat Farms, and
J. H. Langfield, Farm Manager.

The total rainfall for the year was 14.41 inches, the average over the past 19 years being 11.85 inches. The following table shows the rainfall for each month, together with the average over a period of 19 years:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.						May to Oct.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sep.	Oct.				
1929 ...	50	162	77	...	357	309	119	94	13	35	927	220	5	1,441
Avge. 19 years	55	56	110	71	134	177	184	134	91	75	795	44	54	1,185

It will be noticed that the rainfall during the growing period is 1.32 inches above the average, and would indicate that an exceptionally good season had been experienced; but on examining the figures it will be seen that 6.66 inches fell during May and June, whilst for August, September and October, those critical months when the wheat is coming into ear and filling, only 1.42 inches were recorded. September, which is nearly always an anxious month, only yielded 13 points which were registered in four falls and were of very little value. Against the total of 14.41 inches 2.20 inches fell during November, after the crop was ripe, doing a considerable amount of harm, especially to the oat crop.

Time of Seeding Experiment.

This experiment has been conducted for the past seven years with Gluyas Early planted mid-May, June and July. Last year it was decided to conduct the experiment to include a midseason variety, to be planted mid-April, May and June.

The mid-April plots were planted on the 16th of that month, but as no rain fell until the 1st of May, germination took place only two weeks before the May planted plots.

The land was ploughed in June, 1928, to a depth of 4 inches, cultivated with a springtyne cultivator in September, harrowed after 1½ inches of rain in February and cultivated with a springtyne in April. The May, June and July plots were cultivated before planting.

The results obtained this year, together with the average results of past years are as under:—

MERREDIN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Superphosphate—120lbs. per acre. Seed—45lbs. per acre.

Planted.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
April	20	21	22	18	22	54	22	32	24	22	22	29	100
May	22	54	21	5	22	40	21	56	23	16	22	22	100
June	11	27	11	56	14	0	14	37	17	54	13	59	68

MERREDIN EXPERIMENT FARM.

Variety—Gluyas Early. Superphosphate—112lbs. per acre. Seed—45lbs. per acre.

Planted.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.	Average Yields per acre 1923-29.		Percentage Yields, 1923–29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
June	18	16	20	50	23	45	18	45	16	56	19	42	67	19	4	77
May	27	24	28	45	30	5	30	13	29	36	29	13	100	24	51	100
July	9	45	11	49	13	24	9	16	10	58	11	2	38	12	18	50

The results obtained with both varieties confirm those of previous years, the conclusion being that it is inadvisable to extend the planting period to the month of June. If it is not possible to complete the seeding during the month of May, it is better to plant a suitable midseason variety in April.

Rate of Seeding Experiment.

As in previous years this experiment was carried out with two varieties, viz. Nabawa, representing the free stooling varieties, and Noongaar, representing the sparse stooling varieties.

The land was ploughed in June, 1928, to a depth of 4 inches with a heavy disc plow, cultivated in September, harrowed after 1½ inches of rain in February, and springtyne cultivated in April and before planting.

The results are as under:—

MERREDIN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Planted on 8th May. Superphosphate (22%)—120lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.	Average Yields per acre 1913–29.		Percentage Yields. 1913–29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
30lbs. per acre ...	24	22	21	34	22	3	21	34	19	30	21	49	97	18	38	97
45lbs. per acre ...	22	25	23	23	23	9	22	54	20	57	22	34	100	19	37	100
60lbs. per acre ...	23	16	23	31	23	16	21	56	21	12	22	38	100	19	37	100

MERREDIN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT, 1929.

Variety—Noongaar. Planted on 17th June. Superphosphate (22%)—120lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Yields per acre 1913–29.	Percentage Yields 1913–29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
30lbs. per acre	14 44	12 47	11 42	14 30	13 53	13 31	89	17 32	97
45lbs. per acre	15 43	14 37	14 37	15 21	15 43	15 12	100	18 9	100
60lbs. per acre	15 21	15 14	15 43	16 19	16 12	15 46	104	17 39	97

From the results obtained at this farm in this and previous years, it is apparent that it is unnecessary to sow either the sparse or the free stooling varieties at a rate higher than 45 lbs. per acre.

Time of Application of Superphosphate.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be profitable to apply part or whole of the amount when cultivating the fallowed land during late summer or early autumn.

The land was ploughed in June, 1924, with a disc plough to a depth of 4 inches. It was springtyne cultivated in September, harrowed after rain in February, springtyne cultivated in April and again immediately prior to seeding.

The layout of the experiment and the results obtained are given below:—

MERREDIN EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Gluyas Early. Planted on 22nd May. Seed—45lbs. per acre.

Rate of Superphosphate.	Computed Yields per Acre.					Average Yield per acre 1929.	Percentage Yields, 1929.	Average Yield per acre 1928–29.	Percentage Yields, 1928–29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
150lbs. Super in March; 75lbs. at seeding	25 57	24 0	24 22	24 44	25 20	24 53	105	21 49	105
225lbs. Super in March	22 54	23 53	22 25	24 36	24 7	23 35	100	20 43	100
75lbs. Super. in March; 150 lbs. at seeding	24 36	25 57	25 6	27 10	27 2	25 58	110	22 25	108

These results confirm those of the previous year, indicating, as they do, that the yields of the wheat crop are decreased when portion of the fertiliser is not applied at seeding time.

Rate of Application of Superphosphate Experiment.

Last year it was decided to enlarge this experiment so as to ascertain in what proportion a greater rate of superphosphate, up to 300 lbs., would affect the yield, although it was not anticipated that it would be profitable to apply that quantity. It was also decided to include a zero plot having no superphosphate.

In order to preserve the three-plot system this experiment was divided into two sections, in each of which plots treated with 150 lbs. of superphosphate per acre were regarded as controls. Thus in section 1 the rates of 300 lbs and 225 lbs. per acre were compared with the control rate of 150 lbs. per acre, and in section 2 the rates of no superphosphate and 75 lbs. were compared with the control rate.

From the yields on the plots where no superphosphate was applied, it is evident that the crop was benefiting from the residual effects of previous dressings, but as this plot falls on the same place each year, any residue in the soil should eventually become exhausted.

The land was ploughed in June, 1928, to a depth of 4 inches, cultivated with a springtyne cultivator in September, harrowed after 1½ inches of rain in February, cultivated with a springtyne in April and again before planting.

The results obtained are shown hereunder:—

MERREDIN EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Gluyas Early. Planted 22nd May, 1929. Seed—45lbs. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
300lbs. per acre ...	24	36	27	10	26	4	26	4	23	53	25	33	101
150lbs. per acre (Control)	26	26	25	49	25	35	25	20	23	23	25	19	100
225lbs. per acre ...	26	19	26	33	25	57	25	57	22	18	25	25	100

MERREDIN EXPERIMENT FARM.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT, 1929.

Variety—Gluyas Early. Planted on 22nd May. Seed—45lb. per acre.

Rate of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields, 1929.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
No Super.	20	36	21	41	20	21	21	12	16	19	20	2	74
150lbs. per acre (Control)	27	17	27	54	26	55	27	54	26	11	27	14	100
75lbs. per acre ...	26	26	27	10	24	29	22	40	24	71	25	7	92

These results indicate that applications of superphosphate in excess of 75 lbs. and up to 150 lbs. per acre may be applied with profit. They further indicate that it is not profitable to apply superphosphate to the wheat crop in considerable excess of 150 lbs. per acre.

Nitrogen Experiment.

The objects of this experiment are—

1. To determine whether increased yields are obtained when heavy dressings of a nitrogenous fertiliser are applied to the wheat crop in addition to an application of superphosphate.

2. To ascertain whether it is advantageous to apply only part of the nitrogenous fertiliser at seeding time and part during the month of August.

For the purposes of the experiment two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwts. of sulphate of ammonia respectively. With each of these dressings the whole of the fertiliser was applied at the one time—viz., at seeding, in the one instance, and also, in separate plots, the application of half the sulphate was delayed until the month of August.

That portion of the experiment dealing with the application of 1 cwt. of sulphate of ammonia was repeated six times, while that portion dealing with the 2 cwt. of sulphate of ammonia was repeated four times.

This experiment was conducted on both fallowed and unfallowed land.

The results obtained are tabulated below:—

MERREDIN EXPERIMENT FARM.

NITROGEN EXPERIMENT, 1929.

Fallowed Land.

Planted 30th May, 1929. Seed—45lbs. per acre. Superphosphate—120lbs. per acre on all Plots.

Treatment.	Computed Yields per Acre.						Average Yield per acre 1929.	Percentage Yield, 1929.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Sec. 6.		
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%
½ cwt. Ammonium Sulphate at seeding ½ cwt. Ammonium Sulphate in August	20 28	21 41	19 0	18 1	17 32	15 36	18 43	99
No Ammonium Sulphate (Control) ...	21 27	21 12	19 14	18 30	18 30	14 51	18 57	100
1 cwt. of Ammonium Sulphate at seeding ...	20 43	18 45	19 14	17 32	18 45	18 45	18 58	100
½ cwt. Ammonium Sulphate at seeding 1 cwt. Ammonium Sulphate in August	19 0	20 28	...	18 45	14 37	...	18 12	101
No Ammonium Sulphate (Control) ...	18 30	18 30	...	17 47	17 3	...	17 58	100
2 cwts. Ammonium Sulphate at seeding ...	18 45	20 28	...	17 17	19 14	...	18 56	105

MERREDIN EXPERIMENT FARM.

NITROGEN EXPORIMENT, 1929.

Unfallowed Land.

Planted 30th May, 1929. Seed—45lbs. per acre. 120lbs. of Superphosphate per acre on all Plots.

Treatment.	Computed Yields per Acre.						Average Yield 1929.	Percentage Yields. 1929.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec 4.	Sec. 5.	Sec. 6.		
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%
½ cwt. of Ammonium Sulphate at seeding ½ cwt. of Ammonium Sulphate in August	19 30	19 30	17 3	12 25	12 25	13 38	15 45	105
No Ammonium Sulphate (Control) ...	16 4	20 57	17 32	9 45	13 53	12 11	15 4	100
1 cwt. Ammonium Sulphate at seeding ...	15 7	19 0	12 11	10 14	14 22	10 14	13 31	89
1 cwt. of Ammonium Sulphate at seeding 1 cwt. of Ammonium Sulphate in August	20 43	17 3	...	15 7	13 9	...	16 30	105
No Ammonium Sulphate (Control) ...	19 59	17 3	...	12 55	13 9	...	15 46	100
2 cwts. of Ammonium Sulphate at seeding ...	16 48	19 0	...	10 58	15 7	...	15 28	98

These results, being for one year only, are not conclusive. However, they indicate that no substantial increase in yield is obtained either from fallowed or unfallowed land of this type when a nitrogenous fertiliser is applied to the wheat crop.

Seasonal Planting Experiment.

To meet the requirements of this experiment, three sections were needed, viz.:—

(a) Section 1, planted in April, reprsenting early planting.

(b) Section 2, planted in May, representing midseason planting.

(c) Section 3, planted in June, representing late planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

The objects of this experiment are:—

1. To ascertain the most suitable month to plant the Late, Midseason and Early maturing varieties of wheat.

2. To determine the most prolific of each of the three types.

The arrangement of the experiment was similar to that of last year, the control plots, of the variety Nabawa, all being planted in the respective months of the three sections.

The land on which the experiment was conducted was heavy salmon gum and gimlet country. It was ploughed to a depth of 4 inches in June, 1928, springtyne cultivated in September, harrowed after rain in February, springtyne cultivated in May and again just before planting.

The tabulated results are shown hereunder:—

MERREDIN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929—APRIL PLANTING.

Seed—45lbs. per acre. Planted 21st April, 1929. Superphosphate (22%)—120lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields 1929.	Average Percentage Yields 1928–29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Yandilla King ...	Late ...	15 29	3 32	7 3	10 14	6 34	8 34	41	63
Nabawa (Control)	Midseason	22 18	19 37	19 0	20 50	21 49	20 41	100	100
Bencubbin ...	Midseason	23 2	21 5	21 56	23 16	25 20	22 56	110	...
Baroota Wonder Early	Late ...	9 59	7 3	5 28	6 5	5 58	6 54	35	...
Nabawa (Control)	Midseason	20 28	20 28	14 8	20 57	21 27	19 29	100	100
Gluyas Early ...	Early ...	19 59	20 43	20 43	22 10	23 2	21 19	109	100
Canberra ...	Early ...	22 40	21 56	22 3	22 3	23 9	22 22	109	104
Nabawa (Control)	Midseason	20 57	21 5	19 59	19 52	20 14	20 25	100	100
Carrabin	Early ...	15 50	20 28	20 50	19 0	15 29	18 19	89	86

MERREDIN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929—MAY PLANTING.

Seed—45lbs. per acre. Planted 21st May, 1929. Superphosphate (22%)—120lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Percentage Yields, 1928–29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Yandilla King ...	Late ...	17 3	16 41	18 38	15 21	17 3	16 57	74	68
Nabawa (Control)	Midseason	23 53	23 53	23 2	21 41	22 40	23 2	100	100
Bencubbin ...	Midseason	26 26	26 19	26 41	25 28	24 15	25 58	112	...
Baroota Wonder, Early	Late ...	11 27	10 43	13 17	11 34	13 46	12 9	54	...
Nabawa (Control)	Midseason	21 12	23 45	23 2	22 40	21 27	22 25	100	100
Carrabin ...	Early ...	21 12	24 0	24 36	23 16	20 43	22 45	102	98
Merredin ...	Early ...	22 25	25 6	24 0	24 22	23 45	23 56	107	110
Nabawa (Control)	Midseason	21 5	24 15	23 2	21 19	22 25	22 25	100	100
Canberra ...	Early ...	24 22	27 2	28 8	24 22	25 35	25 54	116	118
Gluyas Early ...	Early ...	24 0	24 29	26 11	23 45	23 38	24 25	114	112
Nabawa (Control)	Midseason	20 57	21 41	20 50	20 43	23 9	21 28	100	100
S.H.J.	Early ...	20 43	23 16	20 21	21 27	20 6	21 11	99	95
Geeralving ...	Very Early	21 27	22 32	19 37	19 37	19 14	20 29	98	102
Nabawa (Control)	Midseason	22 3	22 32	20 28	19 44	19 44	20 54	100	100
Noongaar ...	Early ...	26 41	23 16	25 13	23 23	23 45	24 28	117	111

MERREDIN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1929—JUNE PLANTING.

Seed—45lbs. per acre. Planted 21st June, 1929. Superphosphate (22%)—120 lbs.per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Percentage Yields, 1928–29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Carrabin ...	Early ...	17 54	15 43	14 8	13 38	15 43	15 25	102	97
Nabawa (Control)	Midseason	15 29	16 48	13 38	13 46	15 57	15 8	100	100
Gluyas Early ...	Early ...	18 45	18 45	16 12	14 59	17 32	17 15	115	115
Canberra ...	Farly ...	15 21	15 36	12 40	13 9	17 39	14 53	99	106
Nabawa (Control)	Midseason	15 50	15 36	13 31	14 44	15 29	15 2	100	100
Merredin ...	Early ...	15 7	14 37	13 24	14 30	16 26	14 49	99	102
S.H.J.	Farly ...	12 40	12 25	10 51	11 34	12 47	12 3	73	79
Nabawa (Control)	Midseason	17 32	17 25	15 29	13 53	18 23	16 32	100	100
Geeralving ...	Very Early	13 24	12 47	15 14	13 38	14 51	13 59	85	93
Noongaar ...	Very Early	17 17	13 46	15 14	16 41	17 3	16 0	105	108
Nabawa (Control)	Midseason	16 48	13 46	15 14	16 12	13 53	15 11	100	100

From these results it will be seen how risky it is to plant late maturing varieties in these areas, especially on heavy land. Yandilla King, which gives excellent results in districts where the spring rains are more favourable, was, like Baroota Wonder Early, altogether too late. Both these varieties made splendid growth until September, but could not withstand the dry conditions which prevailed from then on. The midseason and early varieties which were further advanced and not carrying so much foliage at the period were not so seriously affected.

The early maturing varieties show to particular advantage in the May and June plantings. The outstanding feature regarding the yields of this experiment is the high place occupied by the standard early variety, Gluyas Early, whether planted in April, May or June.

In the April planting the new midseason variety, Bencubbin, shows to considerable advantage.

Past experience has shown that in normal years it is inadvisable to plant early varieties in April, the midseason varieties being more suitable for planting in this month.

Oat Variety Trial.

This experiment has been conducted for the past seven years. However, this year the variety Mulga has been substituted for Burt's Early as a control. Also this year's trial has been conducted with early and midseason varieties only, the later maturing varieties having, in the past, proved altogether unsuitable for the district.

The experiment comprised both hay and grain sections, six varieties being included in the latter and five in the former. The early maturing variety, Palestine, being a grain variety only, was not planted in the hay section.

The land for the experiment was ploughed in June, 1928, springtyne cultivated in September, harrowed after rain in February and again springtyne cultivated in April.

All plots made splendid growth, the midseason varieties carrying a dense quantity of foliage. These, however, suffered considerably during the dry spell in September, but the earlier varieties, being more advanced, were not so badly affected.

The yields obtained from both the hay and grain sections are as follow:—

MERREDIN EXPERIMENT FARM.

OAT VARIETY TRIAL, 1929.

Grain Section.

Seed—45lbs. per acre. Planted 23rd April, 1929. Superphosphate—120lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre 1929.	Percentage Yields, 1929.	Average Percentage Yields, 1923-29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	%	%
Mulga (Control)	Early ...	37 33	33 33	29 32	34 36	32 22	33 31	100	100
Palestine ...	Early ...	36 15	33 33	23 37	40 8	30 29	33 0	98	...
Burts Early ...	Early ...	27 38	27 16	18 11	23 37	20 33	23 27	69	80
Gidgee	Midseason	36 8	16 33	21 37	14 32	20 26	22 3	64	...
Guyra	Midseason	28 27	11 36	17 15	15 36	16 33	18 5	52	82
Belar	Midseason	30 29	21 37	17 15	12 10	24 27	21 16	61	...
Mulga (Control)	Early ...	37 26	36 37	36 0	39 20	28 20	35 29	100	100

MERREDIN EXPERIMENT FARM.

OAT VARIETY TRIAL, 1929.

Hay Section.

Seed—45lbs. per acre. Planted 23rd April, 1929. Superphosphate—120lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.			Average Yield, 1929.	Percentage Yield, 1929.	Percentage Yield, 1923-29.
		Section 1.	Section 2.	Section 3.			
		C. Q. L.	C. Q. L.	C. Q. L.	C. Q. L.	%	%
Mulga (Control) ...	Early ...	56 3 4	58 3 14	53 3 18	56 2 3	100	100
Burts Early ...	Early ...	55 0 16	52 3 7	48 1 6	52 0 10	92	90
Gidgee	Midseason ...	55 3 22	51 2 1	50 1 2	52 2 7	93	...
Guyra	Midseason ...	50 2 18	46 0 10	48 0 5	48 1 1	87	92
Belar	Midseason ...	52 3 7	49 2 13	47 1 16	49 3 21	90	...
Mulga (Control) ...	Early ...	58 1 18	54 3 2	52 2 20	55 1 4	100	100

These results indicate the superiority of the early maturing variety, Mulga, for both hay and grain in early districts. In view of the adverse season, this trial further demonstrates the drought-resisting qualities of this variety.

FIELD EXPERIMENTS WITH WHEAT AND OATS, 1929.

WONGAN HILLS LIGHT LANDS FARM.

I. Thomas, Superintendent of Wheat Farms, and
A. R. Venton, Farm Manager.

The table hereunder shows the monthly rainfall for 1929 as recorded at the farm, together with the averages for the past 17 years as officially recorded at Wongan Hills township, four miles distant.

——	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1929 at Experiment Farm	22	217	85	*Nil*	261	426	172	140	35	141	1,175	38	4	1,541
1928 at Experiment Farm	76	*Nil*	28	79	124	109	319	169	96	35	852	5	36	1,076
Average 17 years including 1929	44	55	97	62	196	306	273	195	126	94	1,190	39	49	1,536

The season was not a favourable one for this class of land, and none of the crop came up to expectations. This was particularly the case with the oats and the late sown early-maturing varieties of wheat.

During May and June the rainfall was much greater than is usual for that period, and from then on was much below the average. The two extremes effectually prevented heavy yields, as the growth of the crops was retarded in the early stages by the excessive wet and cold. Whilst the October rains were slightly above the average for the month, only a little over a quarter of an inch was effective, the balance being too late, as most of the crop had matured rapidly during the warm dry spell in the latter part of August and September, and was past the stage when rain would have been beneficial.

All the experiments, unless otherwise stated, were planted on fallowed land which had not previously been cropped, the initial ploughing and clearing being done in the one operation.

Time of Seeding Experiment.

This experiment is being conducted to determine the most suitable month for planting the wheat crop in this district.

The early maturing variety, Gluyas Early, and the midseason-maturing variety, Nabawa, were used, the former being planted in May, June and July, and the latter in April, May and June. The land on which the experiment was conducted was of a gravelly nature. It was ploughed during June and July of 1928, disced during August and September, and again in March. Prior to seeding it was springtyne cultivated.

With both varieties the earliest sown plots appeared to advantage, throughout the season, with the Nabawa the disparity between the April and May sowings was very much less marked than between the May and June sowings. With the early variety, Gluyas Early, the May sowing had a very decided advantage over the later planting.

Tabulated results are given below:—

WONGAN HILLS LIGHT LANDS FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Nabawa. Superphosphate (22%)—153lbs. per acre. Seed—43lbs. per acre.

Time of Planting.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields 1929.	Average Yields per acre, 1928-29.		Percentage Yields, 1928-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
April	12	18	13	17	13	46	14	15	13	31	13	27	120	16	34	108
May (Control) ...	10	43	11	20	11	42	11	20	11	5	11	14	100	15	21	100
June	3	39	3	53	4	1	4	1	3	53	3	53	35	6	5	37

WONGAN HILLS LIGHT LANDS FARM.

TIME OF SEEDING EXPERIMENT, 1929.

Variety—Gluyas Early. Superphosphate (22%)—153lbs. per acre. Seed—44lbs. per acre.

Time of Planting.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.	Average Yields per acre, 1928-29.		Percentage Yields, 1928-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
June	3	24	2	48	3	2	3	24	3	10	3	9	43	6	49	48
May (Control) ...	7	3	7	3	7	26	7	41	7	26	7	20	100	14	15	100
July	1	20	1	35	1	42	1	35	1	20	1	30	20	5	36	39

These results confirm in no uncertain manner those of last year, viz., that it is essential that seeding operations should be completed before the end of May.

Rate of Seeding Experiment—Wheat.

As was the case in previous years, this experiment was conducted with two varieties, Nabawa (midseason maturing), representing the free stooling, and S.H.J. (early maturing), representing the sparse stooling types respectively.

The experiment was conducted on gravelly soil originally covered with low scrub and a little York Road poison. It was ploughed during June and July of the previous year, cross ploughed with the same implement during August and September, and disc cultivated during March and April. A springtyne cultivation preceded the planting on the 27th of May. Superphosphate was applied at the rate of 153 lbs. per acre.

The germination was fair, but the growth was very slow and patchy. However, as the plots approached maturity they became more even in appearance, although very short. Stooling was poor, although as would be expected, better with the Nabawa than with the S.H.J.

Early in the season the lowest rate of Nabawa appeared at a decided disadvantage but, as the season advanced, it improved gradually. Subsequent to the middle of August the heavier seeded plots appeared to be more affected by the dry spell which was experienced.

The tabulated results of both varieties for the past season and the average results for 1925-29 are given below:—

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SEEDING EXPERIMENT, 1929—WHEAT.

Variety—Nabawa. Planted on 27th May. Superphosphate (22%)—153lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.	Average Yields per acre, 1925-29.		Percentage Yields, 1925-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lbs. per acre ...	8	10	8	17	7	48	7	19	8	3	7	55	101	15	29	102
45lbs. per acre ...	7	48	7	33	7	55	8	10	7	41	7	49	100	15	14	100
90lbs. per acre ...	8	39	8	32	8	10	7	26	8	10	8	11	105	15	14	100

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SEEDING EXPERIMENT, 1929—WHEAT.

Variety—S.H.J. Planted on 27th May. Superphosphate (22%)—153lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.	Average Yields per acre, 1925-29.		Percentage Yields, 1925-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60lbs. per acre ...	7	26	7	11	7	33	7	3	7	48	7	24	114	13	9	104
45lbs. per acre ...	6	41	6	5	6	34	6	34	6	41	6	31	100	12	40	100
90lbs. per acre ...	7	41	7	19	7	48	7	41	8	10	7	44	119	13	24	106

These results confirm those of previous years, viz., that with a free stooling variety of wheat no advantage is gained by seeding more than 45 lbs. of seed per acre. With a sparse stooling variety, however, the rate may be increased above 45 lbs. with some little advantage, but no benefit is derived by planting at a rate greater than 60 lbs. per acre.

Time of Application of Superphosphate Experiment.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are used, it would be profitable to apply part or all of the fertiliser when cultivating the fallowed land during late summer or early autumn so that the seeding operations can be expedited.

The land on which the experiment was conducted was of the smokebush and tussocky types of plain. It was ploughed 4in. deep with a disc implement during June and July, 1929. It was cross ploughed with the same implement during August and September, and disced to a depth of about two inches during March and April. Immediately prior to planting the land was springtyne cultivated. In spite of the working the land was not in the desired condition at the time of seeding. Insufficient moisture during the fallowed period hindered the work of dealing with the tussocks and of breaking down the soil and consolidating the seed bed. As a result of this condition, germination was rather uneven. This was perhaps more noticeable on the plots where all the superphosphate was applied during

March. Throughout the season growth was very slow, the crop was short and uneven and the stooling poor. In appearance the plots showed little difference, those on which all the superphosphate had been applied in March being but little behind the remainder.

The results obtained this season are given below:—

WONGAN HILLS LIGHT LAND FARM.

Time of Application of Superphosphate Experiment, 1929.

Variety—Nabawa. Planted on 18th May. Seed—43lbs. per acre.

Time of Application of Superphosphate.	Computed Yields per Acre.										Average Yields per acre, 1929.		Percentage Yields, 1929.	Average Yields per acre, 1928-29.		Percentage Yields, 1928-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
75lbs. Super in March ... 150lbs. at Seeding	8	25	8	46	9	1	8	39	8	25	8	39	136	18	1	119
225lbs. in March		*	7	3	6	19	6	5	6	5	6	23	100	15	7	100
150lbs. Super in March ... 75lbs. at Seeding	7	48	7	41	7	48	7	48	8	17	7	50	123	16	41	110

* Discarded.

These results confirm those of last year, viz., that yields are decreased when all or portion of the superphosphate is not applied at seeding time. This decrease is more apparent when the major portion of the superphosphate is applied in March rather than at the time of planting.

Rate of Superphosphate Experiment.

In the previous three years that this experiment was conducted, three rates of superphosphate were used, viz., 225 lbs., 150 lbs., and 75 lbs. per acre respectively. However, this year it was decided to include extra plots planted with no superphosphate and 300 lbs. per acre respectively. In order to preserve the three-plot system of conducting the experiment it was necessary to divide it into two sections, using for each the plots treated with 150 lbs. of superphosphate per acre as controls. Thus in section 1 the rates of 300 lbs. and 225 lbs. were compared with 150 lbs. per acre, and in section 2 the rates of 75 lbs. and no superphosphate were compared with 150 lbs. per acre.

The land was of the smokebush and tussocky type of sandplain. It was ploughed with a disc implement (sundercut) during the previous June and July, cross ploughed during August and September, disc cultivated in March and springtyne cultivated before seeding.

Owing to the land not being broken down to a satisfactory tilth, the germination was uneven. Growth was particularly slow, due to some extent to the effects of the heavy June rains. Stooling also was very poor.

The plots receiving no superphosphate were an absolute failure, only a few plants producing heads. Towards the end of the season a marked difference in favour of the heavier dressing showed between the plots treated with 75 lbs. and 150 lbs. of superphosphate respectively. However, no marked advantage was apparent in the plots planted with rates heavier than 150 lbs. per acre.

The tabulated results are given below:—

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SUPERPHOSPHATE EXPERIMENT NO. 1, 1929.

Variety—Nabawa. Planted on 20th May. Seed—43lbs. per acre.

Rate of Superphosphate.	Computed Yields per Acre.					Average Yield per acre, 1929.	Percentage Yields, 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
225lbs. per acre ...	8 46	8 54	9 30	8 54	8 46	8 58	106
150lbs. per acre ...	8 32	8 17	8 39	8 25	8 17	8 26	100
300lbs. per acre ...	9 1	9 8	9 38	9 23	9 1	9 14	109

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SUPERPHOSPHATE EXPERIMENT NO. 2, 1929.

Variety—Nabawa. Planted on 20th May. Seed—43lbs. per acre.

Rate of Superphosphate.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
75lbs. per acre ...	5 21	5 43	5 58	5 58	6 19	5 52	67
150lbs. per acre (Control)	8 39	8 54	8 39	8 39	8 46	8 43	100
No Superphosphate	...	...	...	...	...	...	...

These results again show that on this class of soil applications of superphosphate considerably in excess of 75 lbs. per acre can be applied with advantage.

The additional results, although for one year only and therefore not conclusive, indicates that it is not profitable to apply superphosphate in considerable excess of 150 lbs. per acre.

Mixed Fertiliser Experiment.

The object of this experiment is to determine whether any advantage is derived by supplementing the dressing of superphosphate with a potassic manure for growing a wheat crop on light land.

Three fertilisers were used and were applied as follow:—

Plot 1.—150 lbs. Superphosphate + 56 lbs. Muriate of Potash per acre.

Plot 2.—150 lbs. Superphosphate per acre (Control).

Plot 3.—150 lbs, Superphosphate + 140 lbs. Kainite per acre.

This section of plots, each ⅛ of an acre, was repeated five times. The quantity of potash stated as K_2O is the same in 56 lbs. of the Muriate as in 140 lbs. of the Kainite.

The land was a tussock-type of sandplain which was ploughed with a Sundercut in June and cross ploughed with the same implement during August and September. It was disced lightly in March and springtyne cultivated prior to planting.

The potassic fertilisers were applied to the respective plots about three weeks before seeding. This course is considered advisable owing to the risk of injuring the young plants incurred by applying a fertiliser of this type at seeding time.

At no time during the growing period could any difference between the different plots be noticed.

The results obtained this year, together with the average results of the past three years, are as under:—

WONGAN HILLS LIGHT LANDS FARM.

MIXED FERTILISER EXPERIMENT, 1929.

Variety—Nabawa. Planted on 18th May. Seed—43lbs. per acre. Superphosphate (22%)—150lbs. per acre.

Fertiliser applied per acre.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields 1929.	Average Yields per acre, 1927-29.		Percentage Yields, 1928-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
Superphosphate 150lbs. ... Muriate of Potash 56lbs.... ...	9	8	9	30	8	54	8	46	8	32	8	58	101	14	59	99
Superphosphate 150lbs. (control)	8	54	8	46	9	16	8	54	8	39	8	54	100	15	7	100
Superphosphate 150lbs. ... Kainite 140lbs.	9	16	9	1	9	16	9	23	8	46	9	8	103	15	7	100

The results of this year, and also the average results for the past three years, show that the yields are not increased by applying a potassic fertiliser to this class of soil.

Nitrogen Experiment.

The objects of this experiment are—

(a) To determine whether increased yields are obtained when heavy dressings of sulphate of ammonia are applied to the wheat crop in addition to an application of superphosphate; and

(b) To ascertain whether it is advantageous to apply only part of this nitrogenous fertiliser at seeding time and part during the month of August (spring).

For the purposes of the experiment, two rates of sulphate of ammonia were applied, viz., 1 cwt. and 2 cwts. respectively.

Superphosphate was applied to all plots at the rate of 120 lbs. per acre, and those plots to which superphosphate only was applied were treated as controls. Comparisons were made between these control plots and those plots receiving 1 cwt. and 2 cwts. of sulphate of ammonia per acre respectively. With each of these dressings the whole of the fertiliser was applied at the one time, viz. at seeding, in the one instance, and also, in separate plots, the application of half of the sulphate was delayed until the month of August.

That portion of the experiment dealing with the application of 1 cwt. of sulphate of ammonia was repeated six times, whilst that portion dealing with the 2 cwt. of sulphate per acre was repeated four times.

This experiment was conducted both on fallowed and non-fallowed land.

The fallowed land was of the smokebush type of light land under crop for the first time. It was ploughed with a disc implement during June and July of 1928 and cross ploughed with the same implement (sundercut) during September, and again in March. The plots were planted on the 21st of May.

Germination was fair on both the fallow and non-fallow sections. From July onwards the plots treated with the sulphate of ammonia appeared more robust. A very marked difference was also apparent between the effects of the various dressings of the nitrogenous fertiliser. As the season advanced this difference became more apparent, the plots being denser and taller according to the quantity of sulphate of ammonia used. The additional dressings, however, at the end of August made no visible difference. In the fallow section the control plots matured 7 to 8 days later than the remainder.

The land on which the non-fallow section was planted was under crop in 1927, and since then had been grazed almost continuously. The virgin vegetation comprised tussocks and low scrub. This land was more of a clayey nature than that on which the fallow plots were situated. It was ploughed with a disc implement (sundercut) to a depth of about 3 inches two days before seeding, and was then springtyne cultivated immediately prior to planting, which took place on 3rd June.

Germination was fairly good, and from July onwards those plots treated with sulphate of ammonia showed to advantage. The difference between the various applications of sulphate of ammonia was also marked, especially as the season advanced. No improvement was noticed by the addition of the extra fertiliser in August.

In this section the control plots matured six to seven days later than the remainder.

The tabulated results of the experiment are given hereunder:—

WONGAN HILLS LIGHT LANDS FARM.

NITROGEN EXPERIMENT, 1929.

Fallow.

Variety—Nabawa. Planted on 21st May. Superphosphate (22%)—120lbs. per acre.
Seed—43lbs. per acre.

Treatment.	Computed Yields per Acre.												Average Yields per acre, 1929.		Percentage Yields, 1929.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.		Sec. 6.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
½ cwt. Ammonium Sulphate at Seeding ½ cwt. Ammonium Sulphate in August	7	33	8	46	8	3	8	17	7	48	8	46	8	12	135
No Ammonium Sulphate (Control)	5	21	5	36	6	34	6	5	6	5	6	49	6	5	100
1 cwt. Ammonium Sulphate at Seeding	11	42	11	42	11	56	10	58	10	29	9	59	11	4	182
1 cwt. Ammonium Sulphate at Seeding 1 cwt. Ammonium Sulphate in August	11	12	11	12	...		10	29	11	12	...		11	1	167
No Ammonium Sulphate (Control)	6	19	5	50	...		7	19	6	49	...		6	34	100
2 cwts. Ammonium Sulphate at Seeding	13	24	12	25	...		11	27	11	27	...		12	11	184

WONGAN HILLS LIGHT LANDS FARM.

NITROGEN EXPERIMENT, 1929.

Non-Fallow.

Variety—Gluyas Early. Planted on 3rd June. Superphosphate (22%)—120lbs. per acre. Seed—44lbs. per acre.

Treatment.	Computed Yields per Acre.						Average Yields per acre, 1·29.	Percentage Yields, 1929.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Sec. 6.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
½ cwt. Ammonium Sulphate at Seeding ½ cwt. in August ...	12 40	11 12	11 27	13 38	11 42	11 42	12 3	123
No Ammonium Sulphate (Control)	10 29	9 45	9 45	11 27	9 1	8 17	9 48	100
1 cwt. Ammonium Sulphate at Seeding	12 55	12 11	10 58	14 37	11 27	12 40	12 28	127
1 cwt. Ammonium Sulphate at Seeding 1 cwt. in August ...	11 56	12 25	...	13 9	13 24	...	12 43	136
No Ammonium Sulphate (Control)	10 14	9 30	...	9 45	8 3	...	9 23	100
2 cwt. Ammonium Sulphate at Seeding	15 7	14 22	...	16 19	12 40	...	14 37	156

As this experiment has been conducted for one year only, no definite conclusions can be derived. The indications, however, are that a very substantial increase is obtained when a large quantity of nitrogenous fertiliser is applied to the wheat crop on this class of soil (sandplain).

Seasonal Planting Experiment.

The objects of the experiment are:—

1. To ascertain the most suitable month to plant the Late, Midseason, and Early maturing varieties of wheat.
2. To determine the most prolific of each of the above types.

To meet the requirements of this experiment three sections were needed, viz.:—

(a) Section 1, planted in April, representing Early planting.

(b) Section 2, planted in May, representing Midseason planting.

(c) Section 3, planted in June, representing Late planting.

Each section planted in its respective month was repeated five times, all plots being eventually harvested for grain.

The land on which this experiment was conducted was ploughed at the end of June, 1928, disc-cultivated at the end of August and at the end of March, and lightly springtyne-cultivated before seeding.

April Planting.—As the seed in this section was sown when the soil was in a dry condition, it did not germinate until the seasonal rains commenced a fortnight later. Germination was good, and early growth even. As the season advanced the two early varieties, as would be expected, made quicker growth than the other varieties, which, however, were healthy and

vigorous. From August onward the late maturing variety Yandilla King, and to a lesser extent the midseason variety Baroota Wonder Early, gradually fell behind the remainder in general appearance.

WONGAN HILLS LIGHT LANDS FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

April Planting.

Seed—43lbs. per acre. Superphosphate—153lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yield, 1929.	Percentage Yield, 1928-29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Yandilla King ...	Late ...	10 43	10 36	10 51	11 27	9 38	10 39	81	99
Nabawa	Midseason ...	14 0	13 39	13 46	13 38	10 21	13 5	100	100
Baroota Wonder Early	Midseason ...	13 9	13 17	13 9	13 9	9 30	12 27	95	99
Gluyas Early ...	Early ...	13 17	13 9	13 9	12 47	11 5	12 41	95	88
Nabawa	Midseason ...	13 31	13 31	13 53	13 24	12 11	13 18	100	100
Canberra	Early ...	16 56	17 10	17 25	15 50	13 46	16 13	122	102
Nabawa	Midseason ...	13 38	13 46	13 46	13 9	11 5	13 5	100	100

May Planting.—Germination and stooling were fair, but growth was very slow. There was little difference in general appearance between the varieties, except the varieties Geeralying and Noongaar. Both these varieties were behind the remainder, particularly the Noongaar. When mature, the whole of the experiment was fairly even in height, but much shorter than usual.

WONGAN HILLS LIGHT LANDS FARM.

SEASONABLE PLANTING EXPERIMENT, 1929.

May Planting.

Seed—43lbs. per acre Superphosphate—153lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yield, 1929.	Percentage Yield, 1929.	Percentage Yields, 1928-29,
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Yandilla King ...	Late ...	6 27	6 34	7 11	7 41	7 19	7 2	75	88
Nabawa	Midseason ...	9 23	8 39	9 30	9 38	9 59	9 26	100	100
Baroota Wonder Early	Midseason ...	7 11	7 3	7 26	7 26	7 55	7 24	78	89
Gluyas Early ...	Early ...	8 54	9 1	9 45	9 30	9 1	9 14	138	...
Nabawa	Midseason ...	6 27	7 41	6 27	6 12	6 41	6 42	100	100
Canberra	Early ...	7 3	8 10	7 33	7 41	7 3	7 30	112	108
Carrabin	Early ...	7 41	7 48	7 41	6 49	5 58	7 11	99	99
Nabawa	Midseason ...	7 33	7 48	7 19	7 19	6 12	7 14	100	100
S.H.J.	Early ...	5 58	6 12	6 19	6 34	6 27	6 16	87	85
Merredin	Early ...	5 36	6 34	6 12	6 5	5 50	6 3	87	...
Nabawa	Midseason ...	7 33	7 19	6 41	6 56	6 27	6 59	100	100
Geeralying ...	Very Early	4 59	5 21	5 6	4 15	3 46	4 41	67	...
Noongaar	Very Early	3 39	3 53	3 24	3 37	3 2	3 31	52	63
Nabawa	Midseason ...	6 27	6 56	6 27	6 27	5 50	6 25	100	100

June Planting.—In this section the germination was poor and growth very slow throughout the season. The plants were poor and spindly, practically no stooling. There was little or no difference between the varieties at any time, except the Noongaar, which was behind the remainder. The heads of all varieties were small and the straw very short.

WONGAN HILLS LIGHT LANDS FARM.

SEASONAL PLANTING EXPERIMENT, 1929.

June Planting.

Seed—43lbs. per acre. Superphosphate—153lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.	Percentage Yields, 1928-29.
		Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.			
		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
Gluyas Early ...	Early ...	2 55	2 48	2 55	2 40	3 24	2 56	90	92
Nabawa	Midseason ...	3 17	3 10	3 24	2 55	3 32	3 16	100	100
Canberra	Early ...	3 39	3 39	3 53	3 32	4 23	3 49	117	97
Merredin	Early ...	3 32	3 24	3 39	2 55	3 53	3 29	97	...
Nabawa	Midseason ...	3 53	3 53	3 32	3 17	3 24	3 36	100	100
S.H.J.	Very Early	2 33	2 48	2 48	2 26	2 33	2 38	73	79
Geeralying ...	Very Early	2 48	3 10	2 40	2 55	3 32	3 1	92	...
Nabawa	Midseason ...	2 55	3 32	3 24	2 55	3 32	3 16	100	100
Noongaar ...	Very Early	1 50	1 35	1 42	1 35	1 57	1 44	53	80
Carrabin	Early ...	3 10	3 39	3 10	3 10	3 53	3 24	117	94
Nabawa	Midseason ...	3 17	2 55	2 33	2 40	3 10	2 55	100	100

The results of this experiment again show that early planting gives the best results on this class of soil.

Whilst the June yields are again obviously unprofitable, even the May planting this year does not approach the April planting. This is partly due to the dry spring, but, it is believed, mainly to the exceptionally heavy rains in June. The excessive wet and cold retarded the growth of all varieties which did not have the chance of making strong vigorous growth before these conditions occurred. It is evident, therefore, that it is best to sow as much as possible in April and early May in order to give the crop a chance to make good headway before these unfavourable conditions are likely to occur.

As would be expected in a season such as was experienced last year, the early maturing varieties have shown to advantage in all three plantings. In a normal season, however, when the spring rains are usually sufficient, experience has shown that it is inadvisable to plant early maturing varieties during April owing to the risk of these varieties being affected by the disease Septoria. To avoid this the late midseason varieties should be planted during that month.

Oat Variety Trial.

This experiment was identical with the trials conducted during the previous two years' seven varieties being planted, including the control variety Burt's Early.

The plots were on a smokebush and tussocky type of sandplain. The land was ploughed with a disc implement (sundercut) during the months of June and July, 1928. During August and September it was again disced, and in March it was disc cultivated. Prior to seeding the land was spring-tyne cultivated.

All the varieties were seriously affected by the lack of rain during the latter part of September. However, they were improved, to some extent, by the belated rains which fell during October. Of all the varieties, Mulga withstood the adverse conditions best.

The tabulated results for both hay and grain are given below:—

WONGAN HILLS LIGHT LANDS FARM.

OAT VARIETY TRIAL, 1929.

Grain Yields.

Planted on 22nd May. Seed—40lbs. per acre. Superphosphate—150lbs. per acre.

Variety.	Computed Yields per Acre.					Average Yields per acre, 1929.	Percentage Yields, 1929.	Average Yields per acre, 1926-29.	Percentage Yields, 1926-29.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
Mulga	5 34	5 26	5 29	5 34	6 16	5 36	140	11 34	96
Burts Early ...	4 15	4 4	4 4	4 4	4 19	4 9	100	12 14	100
Raukura ...	3 4	3 0	3 11	3 33	3 37	3 15	80	10 31	87
Algerian ...	3 11	3 4	3 23	4 19	4 43	3 36	91	14 27	123
Burts Early ...	4 15	4 5	4 15	4 19	4 8	4 12	100	11 39	100
Guyra	4 1	4 12	4 30	4 19	4 30	4 20	104	13 30	115
Burts Early ...	4 15	4 15	4 19	4 19	4 27	4 19	100	16 21	100
Lachlan... ...	4 30	4 43	6 8	6 8	5 34	5 25	126	13 21	83

WONGAN HILLS LIGHT LANDS FARM.

OAT VARIETY TRIAL, 1929.

HAY YIELDS.

Planted 22nd May. Seed—40lbs. per acre. Superphosphate (22%)—150lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.			Average Yield per acre 1929.	Percentage Yield, 1929.	Average Yield per acre 1926–29.	Percentage Yields 1926–29.
		Sec. 1.	Sec. 2.	Sec. 3.				
		C. Q. L.	C. Q. L.	C. Q. L.	C. Q. L.	%	C. Q. L.	%
Mulga	Early ...	5 3 14	7 0 20	7 3 24	7 0 1	149	23 1 4	116
Burts Early (Control)	Early ...	4 1 14	4 3 17	4 3 2	4 2 20	100	20 0 19	100
Raukura ...	Midseason ...	2 0 2	2 0 17	2 0 10	2 0 10	45	15 0 0	74
Algerian ...	Late... ...	3 3 4	3 2 10	3 2 24	3 2 22	76	18 2 13	89
Burts Early (Control)	Early ...	4 2 23	4 1 0	5 2 6	4 3 10	100	20 3 26	100
Guyra	Midseason ...	3 3 11	4 0 13	3 3 19	3 3 24	82	19 1 10	92
Burts Early (Control)	Early ...	4 3 9	6 1 17	6 3 4	6 0 1	100	20 0 13	100
Lachlan... ...	Midseason ...	5 1 19	5 1 26	4 3 2	5 0 25	87	20 1 7	101

These results confirm those of previous years, viz., that the early and midseason maturing varieties are the most suitable for grain and the early varieties for hay. They further demonstrate the suitability of the early maturing variety, Mulga, for both hay and grain under adverse conditions.

Rate of Seeding Experiment—Oats.

As was the case for the similar experiment with wheat, this was planted with a free and a sparse stooling variety, and the land also was prepared identically with that for the wheat experiment.

The results of both representative types are given below, together with average results for the past four years:—

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SEEDING EXPERIMENT, 1929—OATS.

Variety—Algerian. Planted on 25th May. Superphosphate (22%)—150lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields. per acre, 1929.		Percentage Yields, 1929.	Average Yields per acre, 1926-29.		Percentage Yields, 1926-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
45lbs. per acre ...	3	4	3	4	3	11	3	11	3	4	3	7	118	13	14	114
30lbs. per acre ...	2	29	2	29	2	29	2	22	2	29	2	28	100	11	28	100
60lbs. per acre ...	3	4	3	11	3	19	3	19	3	11	3	13	123	13	21	116

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SEEDING EXPERIMENT, 1929—OATS.

Variety—Burts Early. Planted on 27th May. Superphosphate (22%)—150lbs. per acre.

Rate of Seeding.	Computed Yields per Acre.										Average Yields per acre 1929.		Percentage Yields 1929.	Average Yields per acre, 1926-29.		Percentage Yields, 1926-29.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
45lbs. seed per acre	4	1	3	26	4	39	4	15	4	1	4	8	102	14	18	100
30lbs. seed per acre	4	1	3	26	4	39	4	15	3	26	4	5	100	14	18	100
60lbs. seed per acre	4	1	4	15	4	30	4	8	3	33	4	9	102	14	25	101

These results confirm those of the three previous years, viz., that with a free stooling variety like Algerian, increased yields are obtained when the heavier rates of 40 lbs. and 60 lbs. of seed are sown. Of the two rates, however, the average results for the four years disclose that the rate of 40 lbs. per acre is the most economical.

The results with the sparse stooling variety, Burts Early, for this year and the averaged results for the three years the experiment has been carried out, show that there is practically no difference in the yields obtained from the different rates of seed.

It is surprising that with these two varieties the yields of the free stooling type were increased by the heavier rates of seed, whereas no advantage was gained when the heavy rates were sown with a sparse stooling variety. This is the reverse to what was experienced with a similar experiment carried out with wheat, and is contrary to what may have been expected. This may be due to the sparse stooling variety containing a greater number of seeds per bushel than the freer stooling one, which has larger and heavier grain.

MOISTURE AND NITRATE NITROGEN FLUCTUATIONS IN MULCHING EXPERIMENT PLOTS.

STATE EXPERIMENT FARM, MERREDIN.

L. J. H. TEAKLE, Plant Nutrition Officer,
and
G. H. BURVILL, Agricultural Adviser.

The investigations reported by Teakle (1928) were continued on a new set of plots in 1928 and 1929. As it was desired to obtain further and comparable data concerning the effects of cultivation on the soil, very similar methods were used. Also, the soils were of a similar type, locally known as samlon gum and gimlet soils. These soils are described by Teakle and Burvill (1930). The plots were situated west of the farm buildings, being about half a mile from the plots described in the previous discussion. Sampling and laboratory work were carried out as described by Teakle and Burvill (1930). The plots were sampled at each end only, the sites being selected at a distance of three chains from each headland.

Unfortunately the work had to be discontinued after the April sampling owing to the absence of the senior author. However, plot yields were obtained from the Superintendent of Wheat Farms so that the chemical data may be compared with the harvest returns.

In the Mulching Experiment fifteen plots were fallowed in June, 1928, and treated as follows:—

Treatment 1.—Five plots were cultivated during spring and thereafter following every fall of 25 points or more of rain.

Treatment 2.—Five plots were cultivated during spring and before seeding—Control.

Treatment 3.—Five plots were cultivated before seeding only—neglected fallow.

On account of the dry summer in 1928, the plots under treatments 1 and 2 had received the same cultivations by the time of the November sampling, so were treated together. The treatments were considered separately at subsequent samplings.

The Crop Yields.—It seems opportune to discuss the yields obtained in 1928 from the plots dealt with in the previous article by Teakle (1928) as well as those obtained in 1929. The yields in 1928 are reported in Table 1 and those in 1929 in Table 2.

TABLE 1.

Yield of wheat from plots of the Mulching Experiment, Experiment Farm, Merredin, 1928. (Journal of Agriculture (West Aus.), 6: 319, 1929).

Treatments.	Yields.			
	bus.	lbs.	Percentage, 1928.	Percentage 1915-1928.
Treatment 1.—Fallow cultivated during Spring and thereafter following every fall or 25 points or more of rain	17	52	111	103
Treatment 2.—Control. Fallow cultivated during Spring and before Seeding	16	8	100	100
Treatment 3.—Neglected fallow. Fallow cultivated before seeding only	14	40	91	95

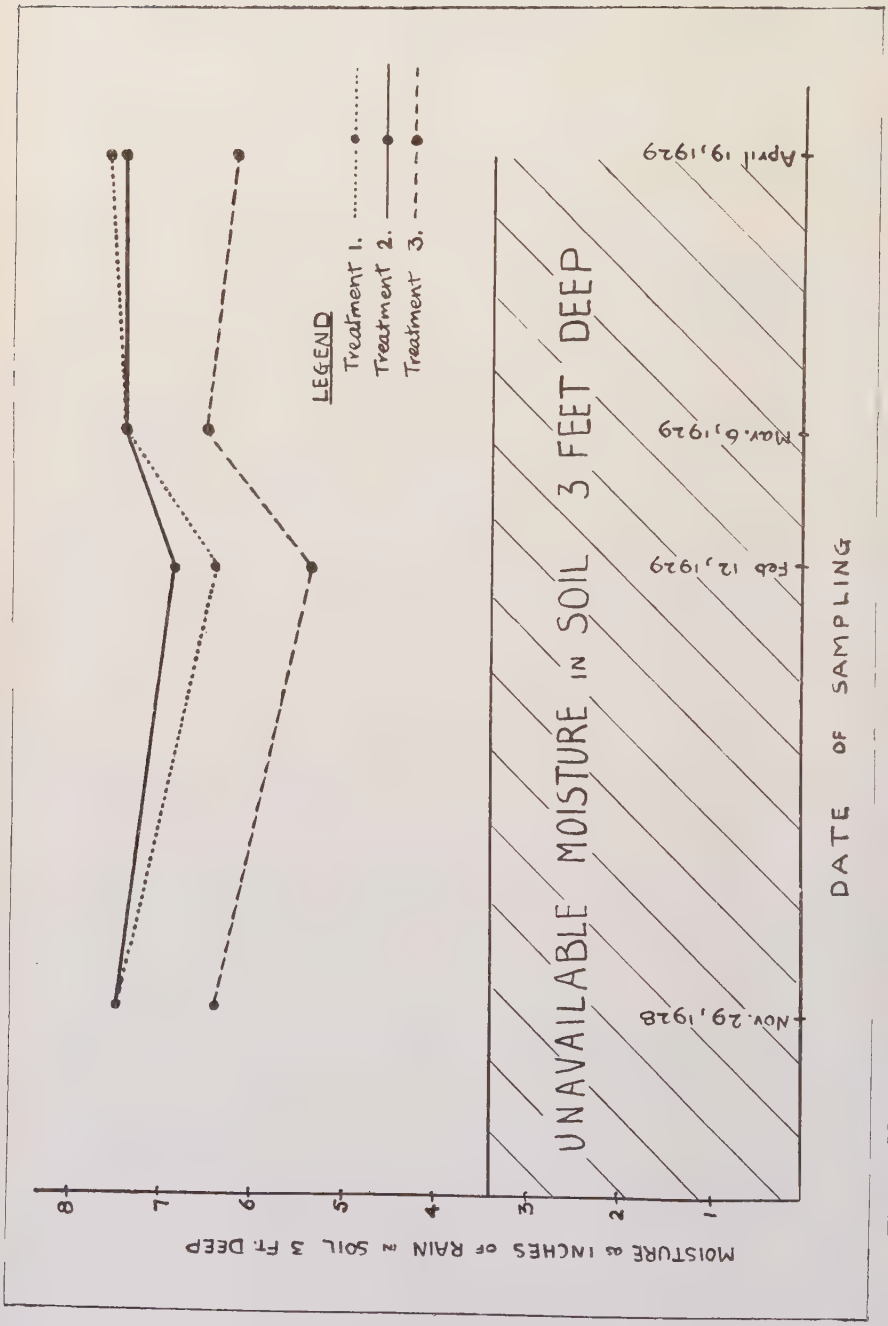


Fig. 1.—Moisture, in terms of an equivalent of rain, in the soil to a depth of 3 feet from plots of the Mulching Experiment, Experiment Farm, Merredin. The amount of moisture regarded as not economically available is shown by the hatched portion of the figure.

TABLE 2.

Yield of wheat from plots of the Mulching Experiment, Experiment Farm, Merredin, 1929. (Figures kindly supplied by the Superintendent of Wheat Farms).

Treatment.	Yields.			
	bus.	lbs.	Percentage, 1929.	Percentage, 1915-1929.
Treatment 1.—Fallow cultivated during Spring and thereafter following every fall of 25 points or more of rain	22	9	98	103
Treatment 2.—Control. Fallow cultivated during Spring and before Seeding	22	26	100	100
Treatment 3.—Neglected fallow. Fallow cultivated before Seeding only	20	47	92	95

The Results of Soil Analyses.—The results of the analyses for the 1928 season are reported in a previous number of this Journal (Vol. 6: 444-448), to which the reader is referred, as it is considered that the results of the two years' work are in sufficient agreement to enable the authors to discuss in detail the analyses made in 1929 only. A repetition of the figures already published seems unwarranted.

The analytical results for 1929 are indicated in Tables 3 and 4, and are represented graphically in Figs. 1 and 2. The moistures are expressed both as per cent. water on the dry soil basis and as the equivalent of rainfall. The amount of water probably available for crop growth is calculated on the assumption that an acre foot of soil weighs 3,750,000 lbs. and that 4 per cent. moisture in the first foot and 8 per cent. moisture in the second and third feet of soil are not economically available for crop growth.

TABLE 3.

The moisture content of plots of the Mulching Experiment, Experiment Farm, Merredin. 1928-29.

Date of Sampling.	Depth.	*Treatment* 1—Fallow cultivated during Spring and thereafter following every fall of 25 points or over of rain.		*Treatment* 2—Control Fallow cultivated during Spring and before Seeding.		*Treatment* 3.—Neglected fallow. Fallow cultivated before Seeding only.	
		Moisture.		Moisture.		Moisture.	
	ins.	%	ins. of rain.	%	ins. of rain.	%	ins. of rain.
Nov. 29th, 1928	0–12	12·0	2·02	12·0	2 02	8·6	1·44
	12–24	16·1	2·70	16·1	2 70	14 7	2 47
Total, 2 ft. ...	...	...	4·72	...	4·72	...	3·91
Feb. 12th, 1929	0–12	8·9	1·50	9·6	1 61	6 8	1·14
	12–24	15·1	2·54	15 2	2 55	12 0	2·02
	24–36	13·9	2·33	16 0	2 69	13 0	2·18
Total, 3ft. ...	...	...	6·37	...	6 85	...	5·34
Mar. 5–6th, 1929	0–12	13 9	2·33	14 1	2 37	12 3	2·06
	12–24	15 6	2 62	15 4	2·59	13 6	2 28
	24–36	14·4	2·42	14·4	2 42	12 9	2·16
Total, 3 ft. ...	...	...	7 37	...	7 88	...	6·50
Apl. 19th, 1929	0–12	13·6	2 28	13·1	2 20	11 6	1 95
	12–24	15·8	2·65	15·3	2 57	12 8	2·15
	24–36	15·6	2 62	15·6	2·62	12 2	2 05
Total, 3ft. ...	...	...	7·55	...	7·39	...	6·15
Available April 19th, 1929, to a depth of 3 ft.	...	...	4·19	...	4·03	...	2·79

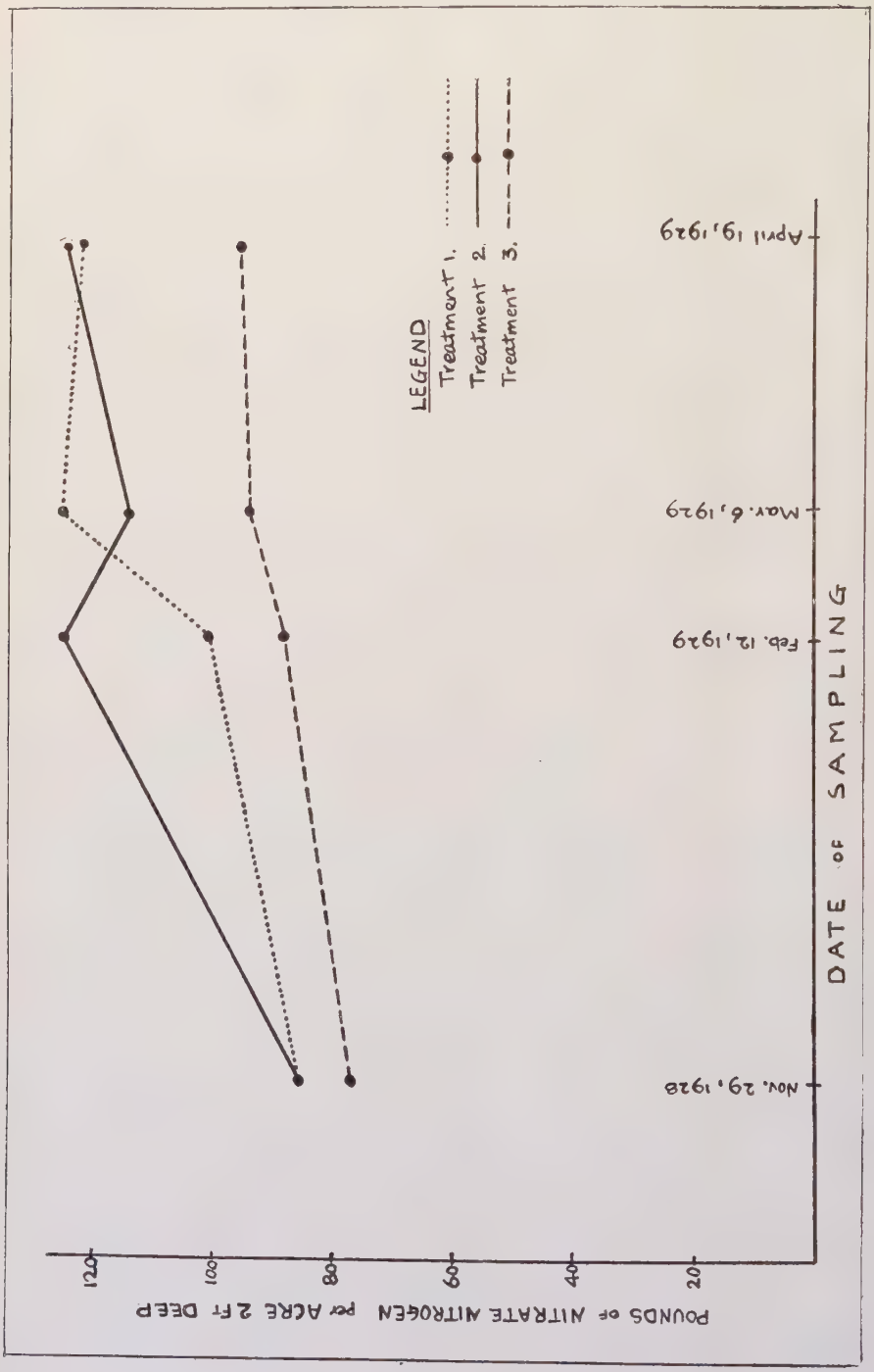


Fig. 2.—Pounds of nitrate nitrogen in the soil to a depth of two feet from plots of the Mulching Experiment, Experiment Farm, Merredin.

TABLE 4.

Nitrate nitrogen contents of plots of the Mulching Experiment, Experiment Farm, Merredin, 1928–29.

Date of Sampling.	Depths.	*Treatment* 1—Fallow cultivated during spring and thereafter following every fall of 25 points or over of rain.		*Treatment* 2—Control. Fallow cultivated during Spring and before Seeding.		*Treatment* 3—Neglected fallow. Fallow cultivated before Seeding only.	
		Nitrate	Nitrogen.	Nitrate	Nitrogen.	Nitrate	Nitrogen.
	ins.	ppm.	lbs. per acre foot.	ppm.	lbs. per acre foot.	ppm.	lbs. per acre foot.
Nov. 29th, 1928	0–12	11·8	44·2	11·8	44·2	8·5	31·9
	12–24	42·0	42·0	11·2	42·0	12·2	45·7
Feb. 12th, 1929	0·12	15·4	57·7	19·4	72·7	12·5	46·8
	12–24	11·6	43·5	14·0	52·5	11·1	41·7
	24–36	9·9	37·2	13·8	51·7	22·2	83·3
Mar. 5–6th, 1929	0–12	18·8	70·5	17·9	67·2	13·8	51·8
	12–24	15·0	56·2	12·5	46·8	11·4	42·7
	24–36	10·4	39·0	13·2	49·5	27·0	101·2
Apl. 19th, 1929	0–12	21·0	78·7	18·8	70·5	16·0	60·0
	12–24	11·7	43·8	14·6	54·8	9·6	36·0
	24–36	13·6	51·0	38·4	144·0	6·8	25·5
			lbs. per acre		lbs. per acre		lbs. per acre
Total Nitrate Nitrogen to a depth of 2 feet, April 19th, 1929	...	...	122·5	...	125·3	...	96·0

DISCUSSION OF RESULTS.

In the experiment of 1928 at the April sampling the well cultivated plots and the control plots were superior to the neglected fallow plots with respect to moisture and nitrate nitrogen—particularly the latter. There was no significant difference between the control and the well cultivated plots. At the end of the season (October 26-27, 1928, the differences between the treatments were very small—probably too small account for the differences in yield. However, any chemical differences are in favour of the treatments giving the highest yields.

In 1929 the yields of the plots under the several treatments showed only slight differences. The yields from the well cultivated fallow (Treatment 1) and the control were practically identical, while that from the neglected fallow was 8 per cent. below the control. This latter difference is probably significant. While this order conforms with the figures obtained for moisture and nitrate nitrogen at the April sampling, the differences are of insufficient magnitude to allow the formulation of definite conclusions. It seems probable, however, that the spring and autumn cultivations resulted in the soil being in a slightly improved physical and chemical condition for the growth of the crop. The accumulation of nitrate nitrogen probably gives an accurate picture of the soil fertility, that complex condition which governs the crop producing power of a soil. The improved tilth, absence of weeds, and the higher moisture contents of the soil during the summer months afford more favourable conditions for the growth of micro-örganisms and the enrichment of the soil solution with respect to the mineral requirements of the crop. The extent of this enrichment is reflected by the activities of the nitrifying (nitrate producing) organisms and the consequent accumulation of nitrate nitrogen.

SUMMARY AND CONCLUSIONS.

The Mulching Experiment plots at the Experiment Farm, Merredin, were sampled between November, 1928, and April, 1929, and the soils examined for moisture and nitrate nitrogen.

The plots received the following cultural treatments:—

Treatment 1.—Fallow cultivated during spring and thereafter following every fall of 25 points or more of rain.

Treatment 2.—Control. Fallow cultivated during spring and before seeding.

Treatment 3.—Neglected fallow. Fallow cultivated before seeding only.

The soils were a red brown clay loam typical of salmon gum and gimlet forests of the wheat belt.

The following conclusions are suggested:—

1. Summer cultivation in the absence of general and regular summer rains leads to no apparent improvement of the plots with respect to moisture and nitrate nitrogen.

2. Plots cultivated after ploughing and before seeding (control) are slightly superior to those which are left in the rough after ploughing and are cultivated before seeding only.

3. The chemical differences, although slight, are reflected by the yields of grain.

4. The differences in yield are probably not due directly to the moisture and nitrate nitrogen content of the soils of the respective plots, but to a general improvement in fertility resulting from the cultivation.

5. Improved tilth and moisture conditions during the summer months enable soil microörganisms to enrich the soil solution with respect to materials such as nitrate, sulphate, lime, potash, etc., which are required by the crop, and make the soil a more suitable medium for the growth of the crop.

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STACK SILAGE.

G. K. Baron-Hay,
Superintendent of Dairying.

The unusually dry summer throughout the Dairy Belt has caused attention to be turned to reliable means of conserving or growing suitable succulent fodder for these comparatively dry months.

Farmers have, among other methods, made inquiries as to economical means of producing silage on dairy farms in the South-West.

Although overhead tub silos are recommended where they can be cheaply constructed, the writer does not believe this expense justified on a dairy farm in the initial stages of development.

Pit or trench silos, as described in the "Journal of Agriculture," September, 1924, are recommended where overhead silos cannot be constructed. The success of pit silage, however, depends on a site being available where water-logging would not be caused by the winter rains.

The loss of material through mould in an overhead or a trench silo should not exceed 7 per cent., if properly constructed.

On farms where it is considered desirable to conserve fodder as silage, and neither of the above methods is applicable, then resort must be had to the stack.

Method.—The building of stack silos should only be contemplated in order to preserve fodder, which would otherwise be difficult to handle economically.

The early top-dressing of pastures is now almost universally practised throughout the Dairy Belt, and has resulted in a plethora of green fodder in the months of September, October, and November. It is probable that this flush season will be considerably increased through the judicious use of nitrogenous fertilisers for top-dressing, and experiments will be carried out in this connection during the coming season.

Once the growth of a pasture has become rank, then the feeding value is decreasing, and the fodder should be immediately consumed by stock, or treated in some other way, so that a fresh, young and more nutritious growth may take place.

Should the weather permit, which generally will not be the case before late in spring, meadow hay is recommended as the most economical method of conserving this nutritious fodder, as with well made hay there is little if any loss in nutriment.

It already has been found necessary in certain districts, however, to cut this rank growth early in spring, while rainy conditions still prevail, and it is in such cases that the stack silo is recommended as a method of saving a large proportion of this fodder when in its most nutritious state. This silage, too, is a further provision for ensuring a supply of green material for food in the summer months.

A number of silage stacks have been examined by Mr. J. T. Armstrong and Mr. M. Cullity, Field Officers, stationed in the Denmark and Manjimup areas respectively, and the causes for success or failure noted.

Stack Silo built by Messrs. Bayley Bros., Denmark. Note settling of material. Earth and logs placed on top to cause even and continuous pressure. It is preferable to open stacks at the top, taking a shallow layer of silage each day.

The following points are necessary to ensure success with the stack silo:—

1. The material to be ensiled should be quite green and succulent. A number of silos were noted in which the proportion of waste was over 30 per cent., due to the material being too dry. This admits an excessive amount of air, causing moulds to develop and allows too much fermentation. Such material should be made into meadow hay.

2. A considerable percentage of clovers is desirable, the best quality silage being noted in those stacks where the material was almost entirely subterranean clover. Crops, such as oats, wheat, maize, and sorghums are not recommended for stack silage, owing to the difficulty of pressing sufficiently to exclude air.

3. The stack should be square, and should contain not less than 20 tons of silage. The square stack has less area exposed in proportion to volume than the oblong one. The minimum base for a stack should be 12 feet by 12 feet.

4. The stack may be completed immediately, but it will usually be found preferable to spread the building over several days. This is no detriment and allows a certain amount of sinking to take place. It should be made as high as possible, 12 feet being a convenient height before settling takes place. Care must be used to ensure the stack is on a level base and that building has been even, so as to allow for regular sinking, otherwise the stack will slip, open, and the material be ruined.

Cutting, carting and stacking may be continued irrespective of the weather, whether rainy or fine. In order to prevent slipping, posts may be placed at each corner, more than four being undesirable as likely to prevent even settlement.

5. As each day's portion of the stack is built, the sides should be scraped free from loose material, which otherwise would be wasted.

6. The stack should be finished off flat at the top, so that posts or planks may be placed thereon, and sacks of dirt or loose earth thrown on to assist in excluding the air by pressure—9 inches of earth has been found quite sufficient, or a layer of sugar bags of earth placed on posts.

Subsidence is considerable, a 12ft. stack commonly sinking to 5 or 6 feet within six weeks.

7. An examination of a number of stacks has shown that, where the average depth to which air has intruded on three sides may be not more than 8 inches, on the side of the prevailing winds during the hot months the material has been destroyed to a depth of 18 inches, through infiltration of air and the drying effect of the wind. It is recommended that this side be protected either by sheet iron or by bushes built against the stack, so as to break the force of the wind.

Messrs. Bayley Bros., of Denmark, have built such stack silos each year for three years, and in future intend to carry out this practice as the general farm routine. These farmers have found that by cutting a field early in spring for silage, the same area, if fertilised with a nitrogenous fertiliser, may be cut some 6 to 7 weeks later for meadow hay. Under these circumstances, stack silage is most profitable.

The following analyses of silage made from pasture, mostly subterranean clover, show that the stack method can supply quite good silage:—

Type of Silo.	Moisture.	Ash.	Protein.	Starchy Matter.	Fibre.	Fat.	Unit Value.
Overhead Tub—3 silos ...	69·00	3·49	4·51	12·48	8·98	1·54	20·45
Pit—2 silos	76·0	3·15	4·25	8·90	6·76	0·94	15·26*
Stack—6 silos	70·9	3·09	4·05	12·22	8·90	0·84	18·16
Green Subterranean Clover	72·0	3·23	5·88	13·24	4·36	1·29	22·02

* Cut too young and succulent.

OAT VARIETY TRIALS.

BODDINGTON AND DARDANUP.

G. GAUNTLETT,
Agricultural Adviser, Dairy Branch.

In conjunction with the other experiments, several Oat Variety Trials were conducted by the Dairy Branch.

The trial at Boddington was planted on a light loam, which was gravelly in places. In its virgin state, the soil grew chiefly wandoo and a little red gum. Complete figures are not available for the rainfall, but it was well below the average of 29 inches.

The experiments show that profitable crops of oats can be grown in this district, and that the later varieties, "Algerian" and "Lachlan," are the best varieties for grain, with "Guyra" as a good dual variety.

The following are the details:—

Planted 28th May. Rate of Seeding—60lbs. per acre. Rate of Super.—1 cwt. per acre.

YIELDS.

Variety.	Hay.				Percentage.	Grain.		Percentage.
	tns.	cwt.	qrs.	lbs.		bus.	lbs.	
Algerian	1	8	2	13	100	23	19	100
Burts Early	–	18	2	25	62·9	20	32	88·6
Mulga	1	5	1	9	88·5	20	1	85·3
Guyra	1	12	3	12	114·8	23	13	99·4
Lachlan	1	5	3	26	90·8	26	38	114·8

Oat Variety Trial—Dardanup.—As at Boddington, the rainfall at Dardanup was considerably below the average, and consequently the yields obtained from the plots are not a true reflex of the district. A yield of 3 tons hay per acre is no uncommon thing for Dardanup. The crop, while being very even, did not stool much.

Besides being an Oat Variety Trial, this experiment supplies useful information in the rotation of crops on well drained land. Three crops may be obtained from this type of land during the year. Maize planted in October-November, and cutting finished by the end of February. The land may then be ploughed, and a catch crop of rape planted in March and fed off. The land can then be further ploughed in June and sown with oats in early August. The latter crop is then cut for hay in middle December.

The following are the details of the experiment:—

Soil—red loam, well drained.
Planted early August.
Rate of Seeding—60lbs. per acre.
Rate of Super—1 cwt. per acre.

RAINFALL, 1929.

——	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
...	3	59	115	209	1,055	940	372	387	164	109	219	27	3,419
Average	60	66	117	174	555	769	768	595	440	315	110	61	4,031

YIELDS.

Variety.	Hay—1 acre.				Per-centage.
	tons.	cwts.	qrs.	lbs.	
Pedigreed Algerian	1	12	1	18	138
Burts Early	1	3	3	2	102
Guyra	1	7	0	1	115
Lachlan	1	2	2	1	96
Mulga	1	0	2	3	88
Farmer's Algerian	1	3	1	18	100

MARKET REPORT.

Messrs. H. J. Wigmore and Co., Ltd., of Wellington Street, Perth, have supplied us with the following information regarding chaff available at the Metropolitan chaff and grain auction sales held in Perth for the period December to February (inclusive). In all cases the prices quoted are for f.a.q. to prime wheaten chaff, packed in new bags.

	Quantity.	Maximum.			Minimum.		
		£	s.	d.	£	s.	d.
December	950	5	5	0	5	0	0
January	1,050	5	10	0	5	0	0
February	1,000	5	5	0	5	0	0

At time of going to press with the last Report, the market stood at £5, and if the above quantities are compared with those of the last issue, it will be seen that considerably less chaff was available during the last three months. The demand, however, has been poor, and that, together with the present financial depression, has prevented the market from appreciating to any extent, at time of writing, the market being steady at £5 5s.

Stocks of hay held in the country are not large, and with a demand from farmers for fodder for seeding, fallowing, etc., in the near future prices should improve somewhat.

Oaten Chaff.—Abnormally heavy supplies were available in December and January, nearly half the quantity mentioned being oaten. Towards the end of February consignments dwindled somewhat and with a better demand, the market now stands as follows:—

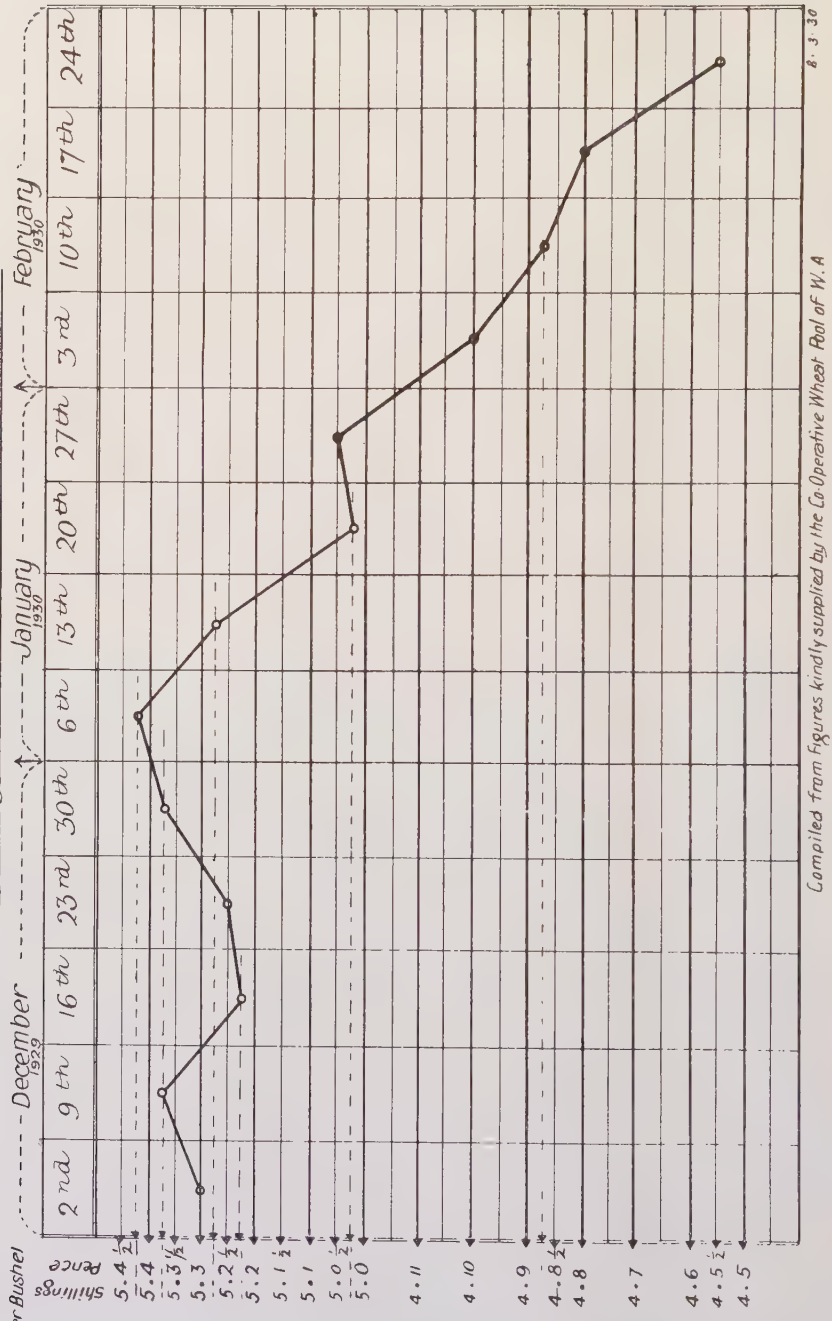
Prime Green ..	£4	12	6	to £4	15	0	per ton.
F.a.q.	£4	5	0	to £4	7	6	per ton.
Mediums ..	£4	0	0	to £4	2	6	per ton.

This market should improve in the near future.

Oats.—During the months enumerated above the market has been glutted, anything but prime quality suitable for seed being difficult to dispose of. The following is an indication of present market values:—

Good clean heavy feeds, 2/2 to 2/4 per bushel.
Mediums, 1/10 to 2/- per bushel.
Light and inferior, from 1/6 per bushel.

Wheat.—This market, in sympathy with the Overseas values, has fluctuated considerably. However, during the last few days there has been a firm enquiry for f.a.q. at from 4/10 to 5/- per bushel. Other qualities at lower prices according to sample.


Return of Wheat Prices Per Bushel C.I.F.& E. London
December 1929
January 1930
February 1930
2nd
9th
16th
23rd
30th
6th
13th
20th
27th
3rd
10th
17th
24th
Per Bushel
Shillings Pence
5.4½
5.4
5.3½
5.3
5.2½
5.2
5.1½
5.1
5.0½
5.0
4.11
4.10
4.9
4.8½
4.8
4.7
4.6
4.5½
4.5
Compiled from figures kindly supplied by the Co-Operative Wheat Pool of W.A.
8.3.30

LIVE STOCK AND MEAT.

For the information of readers of the "Journal," the following particulars have been supplied by Messrs. Elder Smith & Co., Limited, Perth:—

COMPARATIVE YARDINGS OF STOCK SOLD, METROPOLITAN MARKETS, DURING THE MONTHS OF DECEMBER, 1929, AND JANUARY AND FEBRUARY, 1930.

	December.				January.				February.			
	4th.	11th.	18th.	31st.	8th.	15th.	22nd.	29th.	5th.	12th.	19th.	26th.
Sheep	10,835	13,634	15,492	10,280	12,404	13,575	11,921	13,766	13,575	13,031	10,559	8,612
Cattle	1,051	961	1,064	633	777	745	680	665	794	655	775	749
Pigs	642	832	1,263	370	859	852	922	923	956	783	811	848

COMPARATIVE VALUES PER POUND OF STOCK SOLD, METROPOLITAN MARKETS, DURING MONTHS OF DECEMBER, 1929, AND JANUARY AND FEBRUARY, 1930.

	December.				January.				February.			
	4th.	11th.	18th.	31st.	8th.	15th.	22nd.	29th.	5th.	12th.	19th.	26th.
Mutton ...	5½	5½	5½	7½	7½	7	6½	6	6	5½	5¼	6
Beef	7¼	6¾	6	6½	6	6¼	6¾	7¼	7¼	7	7¼	7
Pork	12	12	12	11	11½	11¼	11¼	11¼	11	10½	10	9
Bacon	9	9	9	9	9¼	9¼	9	9	9	9	9	9

PRODUCERS' MARKETS, LTD.

Quarterly Report for Three Months ending 10th February, 1930.

Fruit.—Supplies of all varieties in season has been forward in volume. Early in December Geraldton tomatoes eased, the local coming forward taking their place and sold to a good demand for prime. Good supplies continued up to February. For the past two months prices have been very unsettled. Prime lemons have held their price throughout. Large rough sorts were hard to quit. Towards the end of February fair consignments of green skins were forward, and sold to a fair demand. Early in December a few navels were forward and sold to a good demand, realising up to 22s. double case; at the time late Valencias were in demand and have continued throughout, falling off slightly in volume to the end of the quarter; prime coloured lines realised up to 21s. 6d. three-quarter bushel. Large rough lines from 5s. up, a good quantity of late Valencias with very green skins have been marketed and sold to a poor demand. In December a fair supply of cherries were forward and all prime sold to a fairly good demand. These ceased about the end of December. In the early part there was a fair supply of cool store apples forward, which ceased about the second week in January. Prime stuff realised good prices, Granny Smith realising the best of all varieties. New season apples commenced the third week in December and have since increased in volume. Principal varieties

offering are Jonathans, Cleopatras and Dunns. Fair prices were obtained between the middle of January up to the second week in February, when prices slumped owing to a good quantity of culls and mis-shaped fruit being placed on the market. Since, prices have righted themselves, with prime Jonathans selling up to 12s. 6d., Dunns to 10s. 6d., and Cleopatras to 8s. 6d. Heavy supplies of stone fruit was forward throughout December. Prime apricots brought good prices and small fruit hard to quit. Prime peaches were always in demand owing to so much inferior fruit on the market. Peaches have been supplied heavily throughout, and towards the end heavy supplies of large hard green fruit have been marketed, meeting only a medium demand, and small over-ripe cheap. Plums also have been very heavily supplied. Wickson, Kelsey, Satsumas and English Black were most in demand. Large prunes sold well, others small, including varieties above, were hard to quit at satisfactory rates. In the latter varieties coming forward, Black Diamonds, Presidents, and Delaware, all these realised high prices, up to 21s. three-quarter bushel.

Nectarines were also well supplied, and the majority were small; prime lines always met a good demand, and towards the end of the quarter selling from 18s. to 21s. for prime three-quarter bushel. Grapes came in with early Chaslers and Madalines. We sold to fair demand around the middle of January. Muscats came forward early, realising good prices up to 20s. 9d. open cases; since they have increased in volume, prices being very irregular owing to weather conditions and heavy supplies forward.

Passion fruit were dear in the early part and at midway were met with heavy supplies, selling from 3s. 6d. to 7s. 6d. for three-quarter bushel; same has since eased in volume and are now selling to better average price around 10s. A fair supply of figs forward this year and selling to good demand for prime. In December a fair supply of loquats were forward. The majority of these were also small; prime sorts realised well. Supplies of Cape gooseberries have been light throughout; during the last month the market has been bare. Prime large berries met a good demand. Through December a good quantity of cherries were marketed with all prime lines selling to a good demand, realising good prices. A good quantity came forward very wet and appeared to be packed much too ripe. These realising only a fair price, supplies ceased about the first week in January. A fair supply of strawberries forward to a fair demand, realising fair average prices throughout. There has been a full glut of Bartlett pears forward which in the early part of the season were hard to quit satisfactorily. During the last two weeks they improved, selling to a good demand for prime, realising from 5s. to 12s. 6d.

Vegetables.—The supply of vegetables has been exceptional during the quarter. Metropolitan potatoes have been heavily supplied to a very weak demand and values have been at glut level for most of the period under review. Growers generally have experienced a very bad season with their potato crop. The sudden collapse of the market in the Eastern States early in December caused merchants to cease exporting and this had a weakening effect on local values, for the market has not yet recovered. Country potatoes have been short supplied on the market to a very weak demand, all lines below prime being hard to quit. Pumpkin supplies have been plentiful to a steady demand for prime lines. Growers are inclined to rush their pumpkin in too early to secure the high values ruling early in the season and the market becomes flooded with immature lines that are not only hard to quit but tend to lower values all round. Swedes were

heavily supplied during December and were practically unsaleable. Consignments then ceased until the latter end of January, when they were in demand at high values. Cabbage supplies have been plentiful all through and values have steadily increased until at present they are at their peak for twelve months. Peas were plentiful and during the Christmas season were heavily supplied, causing values to maintain a steady level. Beans also were heavily supplied and values were down to glut level, several times early in the quarter. During January values firmed and continued firm to the end of the period. Brown onions have been plentiful to a steady demand and values have been steady. Lines of extra quality generally realised more than the average, for there is always a special market for this quality. White onions plentiful early in the period but are now easy in supply and values are firmer. Rock melons have not been so heavily supplied this season, growers generally reporting a light crop. Late varieties, mainly "Best of All" and "Rocky Ford," are good sellers, and these are making good values. Water melons have been shorter in supply this season than generally, the large majority being small and mis-shapen. Prime samples have sold well throughout. Marrows have been well supplied to a steady demand, and good lines firm. Cucumbers have been heavily supplied and prime lines sold well all through the period. Celery has been plentiful since the season started and values for prime quality has been firm; small and green lines are not good sellers. Rhubarb has been heavily supplied and growers have had a lean time, values being very low, the heavy glut of stone fruit being the main cause. Bunch lines have been heavily supplied and values were easy during the first part of the quarter, but since have firmed and remained steady. Lettuce supplies were short to a keen demand at high values throughout the quarter.

Eggs.—Early in December supplies were heavy to a slightly firmer demand. Metropolitan new laid hens, 1s. 3d. to 1s. 5d. Supplies eased slightly towards the end of December, and values advanced to 1s. 4½d. to 1s. 6½d. After the holidays the demand was not so keen and prices a little easier. Hen eggs, 1s. 4d. to 1s 5d. During January prices remained unaltered, but early February saw a decreased supply and a small advance in values, 1s. 5d. to 1s. 7½d., with higher values towards the end of February, 1s. 7d. to 1s. 9½d. During the last 10 days the demand has been keen and on March 8th hen eggs realised 2s. 0½d. to 2s. 2d.

Poultry.—Early December supplies were heavy with good demand for Christmas trade, high values realised, prime cockerels 11s. 6d. to 14s. 6d. Middle December saw a heavy supply with quality not so good and demand not so keen. Prime cockerels, 10s. to 11s. 6d.; turkeys were slow of sale, the quality not being satisfactory. After the holidays prices eased, cockerels being 8s. 6d. to 10s.; prime Muscovies (drakes), 10s. to 12s. 6d. During January cockerels were in demand, but Muscovies and aged birds hard to quit. During February prices were lower and Muscovies receded to 8s. to 9s. 6d. Early March supplies lighter and demand good for prime quality cockerels, 8s. to 11s. 6d. Muscovies, 8s. to 12s. 6d.

Carcase Meat.—Our sales opened on December 13th to a representative gathering and prices realised were satisfactory. Sales are held Friday at 9 a.m. and increased supplies to a good demand have been the rule. February saw improved values for lambs and pork, no alteration during early March, except that veal also showed better values.

Latest prices.—Prime pork, 10¼d. to 10¾d.; medium pork, 9d. to 9½d. Veal, prime calves, 8¼d. to 9½d.; medium calves, 7d. to 7¼d. Lamb, 6½d. to 7d. Mutton, 4¼d. to 4¾d.

METEOROLOGICAL INFORMATION.

STATIONS	TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.	
	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum		For Month.	Average.
	Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.		
	DECEMBER, 1929.						JANUARY, 1930.						FEBRUARY, 1930.					
					inches.	inches.					inches.	inches.					inches	inches.
Chapman State Farm	90·7	11·7	60·2	52·0	0·03	0·23	95·7	112·7	61·8	53·2	0·00	0·28	94·2	112·4	63·0	54·1	0·00	0·50
Geraldton	81·9	102·0	61·8	50·0	0·04	0·16	82·8	111·0	63·5	55·0	0·00	0·22	81·0	100·4	65·0	54·8	0·00	0·30
Walebing	89·3	111·0	58·2	47·9	1·18	0·48	96·1	117·2	60·9	54·1	0·00	0·36	93·9	108·2	61·0	51·2	1·43	0·50
Perth	82·0	100·0	60·4	52·0	0·38	0·57	85·9	108·0	62·9	54·1	0·05	0·35	84·3	101·8	62·7	53·2	0·12	0·44
Kalamunda	82·8	103·5	58·3	47·0	0·53	0·78	89·5	107·5	60·7	51·0	0·00	0·57	87·3	102·0	60·8	51·0	0·25	0·67
Bunbury	78·8	95·7	56·5	44·2	0·24	0·59	81·9	98·0	57·3	46·5	0·02	0·45	80·2	94·0	56·9	47·0	0·09	0·54
Bridgetown	84·3	100·0	50·9	36·0	0·74	0·78	90·3	109·0	51·3	38·0	0·00	0·55	89·9	101·4	50·9	39·0	0·05	0·67
Albany	71·0	96·0	56·5	49·0	2·17	1·14	74·4	106·0	59·2	51·5	0·06	0·85	73·4	94·0	59·3	49·0	0·42	0·95
Merredin State Farm	89·1	106·5	59·7	46·0	0·05	0·55	95·4	112·3	66·4	51·2	0·00	0·50	94·9	104·7	62·2	52·4	0·01	0·60
Northam	90·3	110·0	59·2	50·0	0·12	0·35	96·7	115·2	61·5	53·0	0·00	0·29	94·2	107·1	61·5	52·9	0·03	0·39
York	89·3	110·0	57·5	48·5	0·08	0·32	95·2	115·2	60·0	51·0	0·00	0·28	92·6	106·0	61·0	51·0	0·00	0·51
Narrogin State Farm	85·5	105·0	52·1	41·3	0·12	0·60	90·8	110·7	54·7	44·4	0·00	0·34	87·5	101·2	55·1	47·3	0·25	0·58
Katanning	82·8	102·7	52·9	44·5	0·21	0·61	89·6	110·9	54·9	44·4	0·00	0·39	85·8	100·7	56·6	48·4	0·11	0·58
Cape Leeuwin ...	70·7	81·8	60·0	53·0	0·68	0·84	73·7	102·0	61·7	56·0	0·11	0·68	72·3	80·0	61·3	59·0	0·18	0·87

ENUMERATIO PLANTARUM AUSTRALIAE OCCIDENTALIS.

A Systematic Census of the Plants occurring in Western Australia.

CHARLES A. GARDNER,
Government Botanist.

MCMXXX.

PREFACE.

Western Australia is to-day the only State of the Australian Commonwealth which does not possess a text book dealing with its own flora. The official standard work is still Bentham's *"Flora Australiensis,"* published between 1863 and 1878. All subsequent work dealing with the plants of the country has been published either in small papers printed by various societies within Australia, or included in monographs published abroad. For many years past there has been an increasing demand for a Flora of Western Australia, or failing this a list of the species which have been described with references to the publications in which they may be found. Although Bentham's *"Flora Australiensis"* deals with about seventy-five per cent. of our indigenous species, the additions are important as representing in many cases common inland plants, and in addition the nomenclature has been much altered with the advancement of our knowledge, not to mention the changes which have been necessitated by the International Rules governing Nomenclature, so that Bentham's Flora, from the point of view of nomenclature, is now obsolete.

With the exception of a list of plants prepared by Dr. A. Morrison for the Western Australian Year Book for 1901, no sequential list of the plants indigenous to this State has hitherto been published, and it is hoped that this Census may supply a long felt want.

The arrangement of the families and genera in this work is taken from Engler's Classification as given in *Die Naturlichen Pflanzenfamilien*, the only exception being the division of the family *Leguminosae* into the three families as suggested by J. Hutchinson in his "Families of Flowering Plants" (1926). The Rules governing nomenclature have been faithfully observed, and in consequence many well-known species are given new names. The want of a good reference library has made portions of the work extremely difficult, and for the older species, specially those of Linnæus, I have been compelled to quote from more recent works concerning the name and date of the species in question.

The introduced naturalised flora has been dealt with, all the recorded species being included. These are given in italics, and instead of the name and date of the publication in which they were described, I have given the country of origin as shown in the "Index Kewensis."

It was originally intended to include geographical references, and also references to the *"Flora Australiensis,"* but it was found that this would either necessitate making this work inconvenient in size, or interfering with its compactness, and thus no references to Bentham's work are given, but wherever the name of a species differs from that given in the *"Flora Australiensis,"* the synonym as quoted in Bentham's work is given in italics following the original reference.

To Mr. H. G. Elliott, Assistant Plant Pathologist of the Department of Agriculture, I am indebted for assistance in tracing references, and to Mr. G. R. Meadly for assistance in making the Index, and correcting proofs.

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SYSTEMA FAMILIARUM.

Secundum Engler.

EMBRYOPHYTA ZOIDIOGAMA.

PTERIDOPHYTA.

I. FILICALES.
- a. Leptosporangiatae.
  - i. *Eufilicineae.*
    - 1. Polypodiaceae.
    - 2. Parkeriaceae.
    - 3. Gleicheniaceae.
    - 4. Schizaeaceae.
  - ii. *Hydropteridineae.*
    - 5. Salviniaceae.
    - 6. Marsileaceae.
- b. Ophioglossales.
  - 7. Ophioglossaceae.

II. LYCOPODIALES.
- a. Eligulatae.
  - 1. Lycopodiaceae.
- b. Ligulatae.
  - 2. Selaginellaceae.

III. PSILOTALES.
- 1. Psilotaceae.

IV. ISOETALES.
- 1. Isoetaceae.

EMBRYOPHYTA SIPHONOGAMA.

GYMNOSPERMAE.

- a. Cycadales.
  - 1. Cycadaceae.
- b. Coniferae.
  - 1. Podocarpaceae.
  - 2. Cupressaceae.

ANGIOSPERMAE.

I. MONOCOTYLEDONEAE.
- a. Pandanales.
  - 1. Typhaceae.
  - 2. Pandanaceae.
- b. Heliobiae.
  - 1. Potamogetonaceae.
  - 2. Naiadaceae.
  - 3. Aponogetonaceae.
  - 4. Scheuchzeriaceae.
  - 5. Alismaceae.
  - 6. Hydrocharitaceae.
- c. Glumiflorae.
  - 1. Gramineae.
  - 2. Cyperaceae.
- d. Principes.
  - 1. Palmae.
- e. Spathiflorae.
  - 1. Araceae.
  - 2. Lemnaceae.
- f. Farinosae.
  - 1. Flagellariaceae.
  - 2. Restionaceae.
  - 3. Centrolepidaceae.
  - 4. Xyridaceae.
  - 5. Eriocaulaceae.
  - 6. Commelinaceae.
  - 7. Pontederiaceae.
  - 8. Philydraceae.
- g. Liliiflorae.
  - 1. Juncaceae.
  - 2. Liliaceae.
  - 3. Haemodoraceae.
  - 4. Amaryllidaceae.
  - 5. Taccaceae.
  - 6. Dioscoreaceae.
  - 7. Iridaceae.
- h. Microspermae.
  - 1. Burmanniaceae.
  - 2. Orchidaceae.

II. DICOTYLEDONEAE.
- A. Archichlamydeae.
  - a. Verticillatae.
    - 1. Casuarinaceae.
  - b. Urticales.
    - 1. Ulmaceae.
    - 2. Moraceae.
    - 3. Urticaceae.
  - c. Proteales.
    - 1. Proteaceae.
  - d. Santalales.
    - 1. Santalaceae.
    - 2. Opiliaceae.
    - 3. Olacaceae.
    - 4. Loranthaceae.
  - e. Polygonales.
    - 1. Polygonaceae.
  - f. Centrospermae.
    - 1. Chenopodiaceae.
    - 2. Amarantaceae.
    - 3. Nyctaginaceae.
    - 4. Phytolaccaceae.
    - 5. Aizoaceae.
    - 6. Portulacaceae.
    - 7. Caryophyllaceae.
  - g. Ranales.
    - 1. Nymphaeaceae.
    - 2. Ranunculaceae.
    - 3. Menispermaceae.
    - 4. Myristicaceae.
    - 5. Lauraceae.
    - 6. Hernandiaceae.
  - h. Rhoeadales.
    - 1. Papaveraceae.
    - 2. *Fumariaceae.*
    - 3. Capparidaceae.
    - 4. Cruciferae.
    - 5. *Resedaceae.*
  - i. Sarraceniales.
    - 1. Droseraceae.

k. Rosales.
1. Crassulaceae.
2. Cephalotaceae.
3. Saxifragaceae.
4. Pittosporaceae.
5. Byblidaceae.
6. Cunoniaceae.
7. Rosaceae.

l. Leguminales.
1. Mimosaceae.
2. Caesalpiniaceae.
3. Papilionaceae.

m. Geraniales.
1. Geraniaceae.
2. Oxalidaceae.
3. Linaceae.
4. Zygophyllaceae.
5. Rutaceae.
6. Burseraceae.
7. Meliaceae.
8. Tremandraceae.
9. Polygalaceae
10. Euphorbiaceae.
11. Callitrichaceae.

n. Sapindales.
1. Anacardiaceae.
2. Celastraceae.
3. Stackhousiaceae.
4. Sapindaceae.

o. Rhamnales.
1. Rhamnaceae.
2. Vitaceae.

p. Malvales.
1. Tiliaceae.
2. Malvaceae.
3. Bombacaceae.
4. Sterculiaceae.

q. Parietales.
1. Dilleniaceae.
2. Guttiferae.
3. Elatinaceae.
4. Frankeniaceae.
5. Cochlospermaceae.
6. Violaceae.
7. Passifloraceae.

r. Myrtiflorae.
1. Thymelaeaceae.
2. Lythraceae.
3. Sonneratiaceae.
4. Lecythidaceae.
5. Rhizophoraceae.
6. Combretaceae.
7. Myrtaceae.
8. Melastomaceae.
9. Onagraceae.
10. Halorrhagaceae.

s. Umbelliflorae.
1. Araliaceae.
2. Umbelliferae.

B. *Sympetalae.*

a. Ericales.
1. Epacridaceae.

b. Primulales.
1. Myrsinaceae.
2. Primulaceae.

c. Plumbaginales.
1. Plumbaginaceae.

d. Ebenales.
1. Sapotaceae.
2. Ebenaceae.

e. Contortae.
1. Oleaceae.
2. Loganiaceae.
3. Gentianaceae.
4. Apocynaceae.
5. Asclepiadaceae.

f. Tubiflorae.
1. Convolvulaceae.
2. Hydrophyllaceae.
3. Boraginaceae.
4. Verbenaceae.
5. Labiatae.
6. Solanaceae.
7. Scrophulariaceae.
8. Bignoniaceae.
9. Pedaliaceae.
10. Orobanchaceae.
11. Lentibulariaceae.
12. Acanthaceae.
13. Myoporaceae.

g. Plantaginales.
1. Plantaginaceae.

h. Rubiales.
1. Rubiaceae.

i. Cucurbitales.
1. Cucurbitaceae.

k. Campanulatae.
1. Campanulaceae.
2. Lobeliaceae.
3. Goodeniaceae.
4. Brunoniaceae.
5. Stylidiaceae.
6. Compositae.

ENUMERATIO PLANTARUM AUSTRALIAE OCCIDENTALIS.

Auctore.

C. A. GARDNER.

PTERIDOPHYTA.

FILICALES.

Polypodiaceae.

1. *DRYOPTERIS*, Adans, Fam. des. Pl. ii. 20 (1763).
   D. gongylodes, (Schkuhr.) O. Kuntze Rev. Gen. ii. 81, 811 (1891) (*Aspidium unitum*, Swartz.)
2. *NEPHROLEPIS*, Schott, Jen. fil. t. 3 (1834).
   N. exaltata, (Linn.) Schott. Jen. fil. t. 3 (1834).
3. *MICROLEPIA*,
   M. speluncae, (Linn.) Moore, Ind. xciii. (1857) (*Davallia speluncae*, (L) Bak.)
4. *SCHIZOLOMA*, Gaud.
   S. ensifolium, J. Sm. Journ. of Bot. iii. 414 (1841) (*Lindsaya ensifolia*, Sw.)
5. *LINDSAYA*, (Dryand) J. Sm. Mem. Acad. Turin. v. 413 (1793).
   L. linearis, Swartz. Schrad. Journ. 1800 78 (1801).
6. *ASPLENIUM*, Linn. Gen. Pl. 783 (1737).
   A. flabellifolium Cav. Descr. 257 (1802).
   A. praemorsum, Swartz. Prodr. 130 (1788). (*A. furcatum*, Thunb.)
   A. bulbiferum, Forst. Prodr. 80 (1786).
7. *PLEUROSORUS*, Fee. Gen. Fil. 179 (1850-52).
   P. rutifolius, (R.Br.) Fee. Gen. Fil. 180 (1852) (*Grammitis rutaefolia* R.Br.)
8. *BLECHNUM*, Linn. Sp. Pl. ii. 1077 (1753).
   B. orientale, Linn. Sp. ed. ii. 1535 (1763).
9. *STENOCHLAENA*, J. Sm. Journ. of Bot. iii. 401 (1841).
   S. palustris, (Burm.) Bedd. Fern. Br. Ind. suppl. 26 (1876). (*Acrostichum scandens*, Hook.)
10. *GYMNOPTERIS*, Bernh.
    G. Reynoldsii, (F. v. M.) C. Christens, Ind. Fil. 341 (1906) (*Annogramma Reynoldsii*. F. v. M.)
11. *PITYROGRAMMA*, (Link.) Domin de la Fact. Sci. l'Univ. Charles, Prague. 88.3 (1928).
    P. leptophylla, (Linn.) Domin de la Fac. Sci. Univ. Charles, Prague. 88.9 (1928).
12. *CHEILANTHES*, Swartz. Syn. Fil. 5 126 (1806).
    C. Brownii, (Desv.) Domin Biblio Bot. 85 133 (1913).
    C. distans, (R.Br.) Mett. Cheil. 25 n. 19 (1859).
    C. tenuifolia, (Burm.) Swartz. Syn. Fil, 129. 332 (1806).
13. *ADIANTUM*, Linn. Gen. Pl. 782 (1737).
    A. lunulatum, Burm. Fl. Ind. 235 (1768).
    A. aethiopicum, Linn. Syst. Nat. ed. x. ii. 1329 (1759).
14. *PTERIS*, Linn. Hort. Cliff. 443 (1737).
    P. longifolia, Linn. Sp. Pl. ii. 1074 (1753).
15. *PTERIDIUM*, Gled. Scop. Fl. Carn. 169 (1760).
    P. aquilinum, (Linn.) Kuhn. v. Deck. Reisen. iii. 3; bot. 11 (1879). (*Pteris aquilina*).
16. *POLYPODIUM*, Linn. Gen. Pl. 784 (1753).
    P. phymatodes, Linn. Mant. 306 (1771).
17. *ACROSTICHUM*, Linn. Gen. Pl. 785 (1753).
    A. aureum, Linn. Sp. Pl. ii. 1069 (1753).

Parkeriaceae.

1. *CERATOPTERIS*, Brong. in Bull. Soc. Phil. 186 (1821).
   C. thalictroides, Brongn. in Bull. Soc. Phil. 186 (1821).

Gleicheniaceae.

1. *GLEICHENIA*, J. Sm. in Mem. Acad. Turin. v. 419 (1793).
   G. linearis, (Burm.) Clarke in Trans. Linn. Soc. ii. bot. i. 428 (1880) (*G. dichotoma*, Hook).
   G. microphylla, (R.Br.) Christ, Frankr. d. Erd. 339 (1897) (*Platyzoma microphylla*, R.Br.)

Schizaeaceae.

1. *SCHIZAEA*, J. Sm. in Mem. Acad. Turin v. 419 (1793).
   S. fistulosa, Labill. Nov. Holl. Pl. ii. 103 (1906).
2. *LYGODIUM*, Swartz, Schrad. Journ. 1800. 106 (1801).
   L. scandens, (Linn.) Swartz, in Schrad. Journ. 1800, 106 (1801).

Salviniaceae.

1. *AZOLLA*, Lam. Encycl. Meth. i. 343 (1783).
   A. filiculoides, Lam. Encyc. Meth. i. 343, var. rubra, Diels.

Marsileaceae.

1. *MARSILEA*, Linn. Gen. Pl. 799 (1753).
   M. Brownii, A. Braun, Monatsbr. Acad. Berol. 418 (1863) (*M. quadrifolia*, Benth.)
   M. angustifolia, R.Br. Prodr. 167 (1810).
   M. hirsuta, R.Br. l. c. 167.
   M. Drummondii, A. Braun, in Linnaea xxv. 721 (1852).
2. *PILULARIA*, Linn. Sp. Pl. ii. 1100 (1753).
   P. Novae-Hollandiae, A. Br. Monatsber Akad. Berol. 435 (1863) (*P. globifera*, Benth.).

OPHIOGLOSSALES.

Ophioglossaceae.

1. *OPHIOGLOSSUM*, Linn. Gen. Pl. 503 (1753).
   O. coriaceum, A. Cunn. in Hook Comp. Bot. Mag. ii. 361 (1836) (*O. vulgatum*, Benth.).

LYCOPODIALES.

Lycopodiaceae.

1. *PHYLLOGLOSSUM*, Kunze in Mohl et Schlecht. Bot. Zeit. 721 (1843).
   P. Drummondii, Kunze in Mohl et Schlecht. Bot. Zeit. 721 (1843).
2. *LYCOPODIUM*, (Rupp.) Linn. Gen. Pl. 503 (1753).
   L. Drummondii, Spring. Monogr. Lycop. ii. 35 (1849).
   L. cernuum, Linn. Sp. Pl. ed. 2. ii. 1566 (1763).

Psilotaceae.

1. *PSILOTUM*, Swartz. in Schrad. Journ. in ii. 109 (1800).
   P. nudum (Linn.) Griseb. in Veget. d. Karaiben 130 (1857) (*P. triquetrum*, Sw.).

Selaginellaceae.

1. *SELAGINELLA*, Beauv. Prodr. des. Fam. de L'Aeth. 101 (1805).
   S. Preissiana, Spring. Monogr. Lycop. ii. 61 (1849).
   S. uliginosa, Spring. l. c. 60.
   S. proniflora, (Lam.) Baker in Journ. Bot. xiv. 156 (1885). (*S. Belangeri* Spring.).

Isoetaceae.

1. *ISOETES*, Linn. Skanska Resa 420 (1751).
   I. Drummondii, A.Br. in Berol. Monatsber 593 (1863).

GYMNOSPERMAE.

CYCADALES.

Cycadaceae.

1. *CYCAS*, Linn. Hort. Cliff. 482 (1737).
   C. Lane-Poolei, Gardner in Bull. For. Dept. xxxii. 30 (1923).
   C. furfuracea, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 108 (1918).
   C. angulata, R.Br. Prodr. 348 (1810) (C. media, Benth.).
   C. basaltica, Gardner in Bull. For. Dept. xxxii. 31 (1923).
2. *MACROZAMIA*, Miq. Monogr. Cycad. 36 (1841).
   M. Reidlei (Gaud.) Gardner. comb. nov. (*M. Fraseri*, Miq.)
   M. Dyeri, (F.v.M.) Gardner. comb. nov. (*Encephalartos Dyeri*, F.v.M.)

CONIFERAE.

Podocarpaceae.

1. *PODOCARPUS*, L' Herit. Pers. Syn. Pl. ii. 580 (1807).
   P. Drouyniana, F. v. M. Fragm. iv. 86. t. 31 (1864).

Cupressaceae.

1. *ACTINOSTROBUS*, Miq. in Lehm. Pl. Preiss. i. 644 (1845).
   A. pyramidalis, Miq. in Lehm. Pl. Preiss. i. 644 (1845).
   A. acuminatus, Parlat. Ind. Sem. Hort. Florent. 25 (1862).
2. *CALLITRIS*, Vent. Decas Gen. Nov. 10 (1808). (*Frenela*, Mirb. p. p.).
   C. Roei, (Endl.) F. v. M. Census 109 (1882).
   C. Drummondii, (Parlat) F. v. M. Census 109 (1882).
   C. Morrisoni, R. T. Baker in Proc. Linn. Soc. N.S.W. xxxi. 717 (1907).
   C. robusta, (R.Br.) Mirb. in Mem. Mus. Par. xiii. 74 (1825).
   C. verrucosa, (R.Br.) Mirb. l. c. 74.
   C. glauca, (R.Br.) Mirb. l. c. 74.
   C. intratropica. (F. v. M.) R. T. Baker, Pines of Australia, 172 (1910).

ANGIOSPERMAE.

MONOCOTYLEDONEAE.

PANDANALES.

Typhaceae.

1. *TYPHA* (Tourn.) Linn. Syst. ed. i. (1735).
   T. angustifolia, Linn. Sp. Pl. 971 (1735).

Pandanaceae.

1. *PANDANUS*, (Rumph.) Linn. fil. Suppl. 64 (1781).
   P. odoratissimus, Linn. fil. Suppl. 424 (1781).
   P. aquaticus, F. v. M. Fragm. v. 40 (1856).

HELIOBIAE.

Potamogetonaceae.

1. *POSIDONIA*, Koenig. Ann. of Bot. ii. 95 (1805).
   P. australis, Hook, fil. Fl. Tasm. ii. 43 (1860).
2. *POTAMOGETON*, (Tourn.) Linn. Syst. ed. i. (1735).
   P. tricarinatus, F. v. M. et A. Benn. in Brit. Journ. Bot. xxx. 229 (1892) (*P. natans*, Bth.).
   P. javonicus, Hassk. in Verhn. Natur. K. Ver. Nedrl. Ind. i. 26 (1856).
   P. Drummondii, Benth. Fl. Austr. vii. 171 (1878).
   P. orchreatus, Raoul Ann. Soc. Nat. Ser. iii. 117 (1844). (*P. obtusifolius*, Mert.).
   P. pectinatus, Linn. Sp. Pl. 127 (1753).
3. *RUPPIA*, Linn. Syst. Nat. 9 (1735).
   R. maritima, Linn. Sp. Pl. 127 (1753).
4. *CYMODOCEA*, Koenig. in Kon. & Sims Ann. Bot. ii. (1806).
   C. angustata, Ostf. in Dansk. Bot. Arkiv. ii. no. 6, 19 (1916).
   C. isoetifolia, Aschers, Sitzber, Geo. Nat. Freunde Berlin 3 (1867).
   C. antarctica, (Labill.) Endl. Gen. Pl. 230 (1836).
5. *DIPLANTHERA*, Thou. Gen. Nov. Madag. 3 (1806).
   D. uninervis, (Forsk.) Aschers in Engl. et Prant. Naturpflanz. 37 (1897).
6. *ALTHENIA*, Petit. in Ann. Soc. Obs. i. (1829). (*Lepilaena*, J. Drumm.)
   A. australis, (Drum.) Aschers. in Engl. et Prantl. Natpflanz. ii. 1. (1887).
   A. Preissii, (Lehm.) Aschers et Graebn. in Engler's Pflanzenreich, Potamog. 160 (1907).

Naiadaceae.

1. *NAIAS*, Linn. Sp. Pl. ed. i. 1015 (1753).
   N. marina, Linn. Sp. Pl. ed. i. 1015 (1753) (*N. major*, All.).
   N. tenuifolia, R.Br. Prodr. 345 (1810).

Aponogetonaceae.

1. *APONOGETON*, Linn. fil. Suppl. Pl. 32 (1781).
   A. elongatus, (F. v. M.) Benth. Fl. Austr. vii. 188 (1878).

Scheuchzeriaceae.

1. *TRIGLOCHIN*, (Riv.) Linn. Syst. ed. i. (1735).
   T. striata, Ruiz et Pav. Fl. Peruv. iii. 72 (1802).
   T. mucronata, R.Br. Prodr. 343 (1810).
   T. calcitrapa, Hook. Ic. Pl. viii. t. 731 (1845).

T. Stowardi, N. E. Brown in Kew Bull. Misc. 189 (1914).
T. turrifera, Ewart in Vict. Nat. xxiii. 43 (1906).
T. centrocarpa, Hook. Icon. Pl. viii. t. 728 (1845).
T. minutissima, F. v. M. Fragm. vi. 82 (1867).
T. trichophora, Nees et Essenbach in Lehm. Pl. Preiss. ii. 54 (1846).
T. Muelleri, Buchenau in Engl. Pflanzenreich iv. 15, 12 (1903).
T. procera, R.Br. Prodr. 343 (1810).
T. pterocarpa, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 110 (1918).

Alismaceae.

1. *ALISMA*, Linn. Gen. ed. I. 108 (1737).
   A. oligococcum, F. v. M. Fragm. i. 23 (1858).
2. *DAMASONIUM*, Mill. Gard. Dict. ed. vi. (1752).
   D. minor, (R.Br.) Buchenau, Ind. Crit. in Abh. Nat. Ver. Brem, ii. 20, 39 (1868). (*D. australe*, Salisb.)

Hydrocharitaceae.

1. *OTTELIA*, Pers. Syn. Plant. i. 400 (1805).
   O. ovalifolia, (R.Br.) L. C. Rich, in Mem. Inst. Fr. ii. 78 (1811).
2. *MAIDENIA*, (W. V. Fitzg.) Rendle, in Journ. Bot. liv. 313 (1916).
   M. rubra, (W. V. Fitzg.) Rendle, in Journ. Bot. liv. 313 (1916).
3. *VALLISNERIA*, (Mich.) Linn. Gen. ed. i. 300 (1737).
   V. spiralis, Linn. Sp. Pl. 1015 (1753).
4. *HALOPHILA*, Thou. Gen. Nov. Madag. n. 6 (1806).
   H. ovalis, (R.Br.) Hook. f. Fl. Tasm. ii. 45 (1860).
   H. spinulosa, (R.Br.) Aschers. in Nuemayer. Anleit. Wissan. Beob. 368 (1875).

GLUMIFLORAE.

Gramineae.

1. *CHIONACHNE*, R.Br. in Beauv. Pl. Jav. Rar. 15 (1838).
   C. cyathopoda, (F.v.M.) Benth. Fl. Austr. vii. 516 (1878).
2. *DIMERIA*, R.Br. Prodr. Fl. Nov. Holl. 204 (1810).
   D. ornithopoda, Trin. Fund. Agrost. 167 (1820). (*D. tenera*, Trin.).
3. *IMPERATA*, Cyrillo, Pl. Rar. Ic. ii. 26. t. 11 (1792).
   I. cylindrica, (Linn.) Beauv. Agrost. 165 (1812) (*I. arundinacea*, Cyrillo).
4. *POLLINIA*, Trin. in Mem. Acad. Petersb. ser. vi. ii. 304 (1833).
   P. fulva, (R.Br.) Benth. Fl. Austr. vii. 526 (1878).
5. *ROTTBOELLIA*, Linn. fil. Nov. Gram. Gen. in Amoen Acad x. 22 (1779) p.p.
   R. rottboellioides, (R.Br.) Druce in Rep. Bot. Exch. Cl. Brit. Isles. 1916, 644 (1917). (*R. ophiuroides*, Benth.)
   R. compressa, Linn. f. Suppl. 114 (1781). (*Hemarthria compressa*, R.Br.)
6. *ISCHAEMUM*, Linn. Gen. ed. ii. 525 (1742).
   I. nervosum (Rottb.) Gardner n. comb. (*I. laxum*, R.Br.)
7. *ANDROPOGON*, Linn. Sp. Pl. ed. i. 1045 (1753).
   A. intermedius, R.Br. Prodr. 202 (1810).
   A. Ischaemum, Linn. Sp. Pl. 1047 (1753).
   A. sericeus, R.Br. Prodr. 201 (1810).
   A. affinis, R.Br. Prodr. 201 (1810).
   A. annulatus, Forsk. Fl. Ægypt. Arab. 173 (1775).
   A. procerus, R.Br. Prodr. 202 (1810).
   A. exaltatus, R.Br. l. c. 202.
   A. bombycinus, R.Br. l. c. 202.
   A. brevifolius, Swartz. Fl. Ind. occ. i. 209 (1797) (*A. fragilis*, R.Br.).
   A. axilis, Hochst. in Flora xxvii. 241 (1844).
   A. Gryllus, Linn. Cent. Pl. ii. 33 (1759). (*Chrysopogon Gryllus*, Trin.)
   *A. *halepensis* (Linn.) Sibth. et. Sm. Reg. calid.
   A. australis, Spreng. Syst. i. 287 (1825). (*Holcus plumosus*, R.Br.)
   A. stipoides, (Ewart) Gardner n. comb. (*Sarga stipoidea*, Ewart & White.)
   A. intrans. F.v.M. Cens. Austr. Pl. 132 (1882).
8. *HETEROPOGON*, Pers. Syn. Glum. ii. 533 (1807).
   H. hirtus, Pers. Syn. Glum. ii. 533 (1807). (*H. contortus*, Roem. et Schultz.)
   H. insignis, Thw. Enum, Pl. Ceyl. 437 (*Andropogon triticeus*, R.Br.).

9. *THEMEDA*, Forsk. Fl. Ægypt. Arab. 178 (1775). (*Anthistiria*, Linn. f.)
T. triandra, Forsk. Fl. Ægypt. Arab. 178 (1775). (*A. imberbis*, Retz. & *A. ciliata*, Benth.)
T. avenacea, (F.v.M.) Maiden et Betche, Cens. Pl. N.S.W. 15 (1916). (*A. avenacea*, F.v.M.)

10. *ISEILEMA*, Anderss. in Not. Act. Upsal. iii. 2. 250 (1856). (*Anthistiria*, Linn. f.)
I. membranacea, (Lindl.) Anderss. in Nov. Act. Upsal. iii. 2. 250 (1856). (*A. membranacea*, Ldl.)

11. *TRAGUS*, Hall. Hist. Stirp. Helv. ii. 203 (1768).
T. racemosus, (Linn.) Hall. Hist. Stirp. Helv. ii. 203 (1768). (*Lappago racemosa*, Willd.)

12. *NEURACHNE*, R.Br. Prodr. Fl. Nov. Holl. 196 (1810).
N. alopecuroides, R.Br. Prodr. 196 (1810).
N. Muelleri, Hack in Oest, Bot. Zeit. xlv. 329 (1895).
N. Mitchelliana, Nees in Hook. Lond. Journ. ii. 410 (1843).
N. multiculmis, R. Pilger in Engler's Botan. Jahrb. xxxv. 68 (1904).

13. *PEROTIS*, Ait. Hort. Kew ed. I. i. 85 (1789).
P. rara, R.Br. Prodr. 172 (1810). (*P. latifolia*, Ait.)

14. *ARUNDINELLA*, Raddi. Agrost. Bras. 37. t. 1. (1823).
A. brasiliensis, Raddi. Agrost. Bras. 37. t. i. Fig. 3 (1823). (*A. nepalensis*, Trin.)

15. *PASPALUM*, Linn. Syst. ed. x. 855 (1759).
P. scrobiculatum, Linn. Mant. i. 29 (1767).
P. distichum, Linn. Syst. Nat. ed. x. 855 (1759).

16. *ERIOCHLOA*, Humb. in H.B. et. K. Nov. Gen. et sp. i. 94. t. 30 & 31 (1815).
E. punctata, (Linn.) Hamilt. Prodr. Pl. Ind. occ. 5 (?).

17. *ISACHNE*, R.Br. Prodr. Fl. Nov. Holl. 196 (1810).
I. australis, R.Br. Prodr. 196 (1810).

18. *DIGITARIA*, Hall. Hist. Stirp. ii. 244 (1768). (*Panicum*, Benth. p.p.)
D. ctenantha, (F.v.M.) Hughes, Kew Bull. Misc. 310 (1923). (*P. ctenanthum*, F.v.M.)
D. longiflora, (Retz.) Pers. Syn. i. 85 (1805). (*Paspalum longiflorum*, Retz.)
D. marginata, Link. Hort. Berol. i. 229 (1827). (*Panicum sanguinale*, Benth. p.p.)
D. sanguinalis (Linn.) Scop. Fl. Carn. ed. ii. i. 52 (1772). (*P. sanguinalis*, Linn. p.p.)
D. Brownii, (Roem et Schultz) Hughes, Kew Bull. Misc. 313 (1923). (*P. leucophleum*, Benth.)
D. ammophila, (F.v.M.) Hughes, l. c. 313. (*P. divaricatissimum*, var.)
D. coenicola, (F.v.M.) Hughes, l. c. 313. (*P. coenicolum*, F.v.M.)

19. *BRACHIARIA*, Griseb in Ledeb. Fl. Ross. iv. 469 (1853).
B. holsericea, (R.Br.) Hughes, in Kew Bull. Misc. 315 (1923). (*P. holsericeum*, R.Br.)
B. piligera, (F.v.M.) Hughes, l. c. 315.
B. distachya (Linn.) A. Camus. Fl. Indo-China vii. 437 (1922). (*P. distachyum*, Linn.)

20. *PASPALIDIUM*, Stapf. in Prain. Fl. Trop. Afr. ix. 582 (1920).
P. jubiflorum, (Trin.) Hughes, Kew Bull. Misc. 317 (1923). (*P. flavidum* & *P. gracile*, p.p.)
P. basicladum, Hughes, l. c. 318.
P. gracile, (R.Br.) Hughes, l. c. 318. (*Panicum gracile*, R.Br.)
ECHINOCHLOA, Beauv. Agrost. 53. ii. f. 2 (1812).
**E. colona*, (Linn.) Link. Reg. calid. (*Panicum colonum*, Linn.)
**E. Crus-Galli*, (Linn.) Beauv. Reg. calid. (*P. Crus-Galli*, Linn.)

21. *PARACTAENUM*, Beauv. Agrost. 47. t. x. f. 6 (1812).
P. Novae-Hollandiae, Beauv. Agrost. 47. t. x. f. 6 (1812). (*Panicum reversum*, F.v.M.)

22. *PANICUM*, Linn. Sp. Pl. 55 (1753).
P. cymbiforme, Hughes, in Kew Bull. Misc. 323 (1923). (*P. antidotale*, Benth. p.p.)
P. capillipes, Benth. Fl. Austr. vii. 484 (1878).
P. Queenslandicum, Domin in Fedde. Repert. x. 59 (1911).
P. decompositum, R.Br. Prodr. 191 (1810).
P. effusum, R.Br. Prodr. 191 (1810).

23. *ICHNANTHUS*, Beauv. Agrost. 56. t. xii. f. 1 (1812).
I. australiensis, (Domin) Hughes, Kew Bull. Misc. 329 (1923). (*P. australiense*, Domin.)
I. Muelleri, Hughes, l. c. 329.

24. *SACCIOLEPIS*, Nash. in Britton. Man. Bot. 89 (1901).
S. myosuroides, (R.Br.) Hughes in Kew Bull. Misc. 330 (1923). (*P. myosuroides*, R.Br.)

25. *SETARIA*, Beauv. Fl. Owar. ii. 80 (1807). (*Chaetochloa*, Scribn. (1897).)
S. glauca, (Linn.) Beauv. Agrost. 51 (1812).
S. verticillata, (Linn.) Beauv. l. c. 51.
S. viridis, (Linn.) Beauv. l. c. 51.
S. Buchanani, A. S. Hitchc. in Proc. Linn. Soc. N.S.W. lii. (ii.) 185 (1927).
S. Carnei, H. S. Hitchc. l. c. 185.
S. macrostachya, H.B. et K. Nov. Gen. et Sp. i. 110 (1815).

26. *CENCHRUS*, Linn. Coroll. Gen. 20 (1737).
*C. *tribuloides*, Linn. Am. bor.
C. elymoides, F.v.M. Fragm. viii. 107 (1874).

27. *PSEUDOCHAETOCHLOA*, A. S. Hitchc. in Journ. Washgtn. Acad. Sci. xiv. 21. 492 (1924).
P. australiensis, A. S. Hitchc. in Journ. Washgtn. Acad. Sci. xiv. 21. 492 (1924).

28. *PENNISETUM*, Rich. in Pers. Syn. i. 72 (1805).
P. villosum, R.Br. in Salt. Abyss. App. 62 (1818).
P. Basedowii, Summerhayes & Hubbard, Kew. Bull. Misc. 440 (1926).
P. cenchroides, Rich. in Pers. Syn. i. 72 (1805).
P. arnhemicum, F. v. M. Fragm. viii. 109 (1873).

29. *PLAGIOSETUM*, Benth. in Hook. Ic. Pl. xiii. 33 (1877).
P. refractum, (F.v.M.) Benth. in Hook. Ic. Pl. t. 1242 (1877).

30. *CHAMAERAPHIS*, R.Br. Prodr. Fl. Nov. Holl. 193 (1810).
C. spinescens, (R.Br.) Poir. Encycl. Suppl. ii. 189 (1817).

31. *XEROCHLOA*, R.Br. Prodr. Fl. Nov. Holl. 196 (1810).
X. imberbis, R.Br. Prodr. 197 (1810).
X. barbata, R.Br. l. c. 197.
X. laniflora, (F. v. M.) Benth. Fl. Austr. vii. 502 (1878).
STENOTAPHRUM, Trin. Fund. Agrost. 175 (1820).
**S. dimidiatum*, (Linn.) Brongn. (Trop. et. Sub. Trop. Reg.).

32. *SPINIFEX*, Linn. Mant. ii. 163 (1771).
S. hirsutus, Labill. Nov. Holl. Pl. ii. 81. t. 230 (1806).
S. longifolius, R.Br. Prodr. 198 (1810).

33. *ORYZA*, Linn. Syst. ed. I. (1735).
O. sativa, Linn. Sp. Pl. 333 (1753).
EHRHARTA, Thunb. in Vet. Acad. Handl. Stockh. 216 t. 8 (1779).
**E. longiflora*, Sm. (Africa aust.).
**E. brevifolia*, Schrad. (Africa aust.).
**E. calycina*, Sm. (Africa aust.).

34. *MICROLAENA*, R.Br. Prodr. Fl. Nov. Holl. 210 (1810).
M. stipoides, (Labill) R.Br. Prodr. 210 (1810).

35. *TETRARRHENA*, R.Br. Prodr. Fl. Nov. Holl. 209 (1810).
T. laevis, R.Br. Prodr. 210 (1810).
PHALARIS, Linn. Syst. ed. I. (1735).
**P. minor*, Retz. Reg. Medit.
**P. canariensis*, Linn. Reg. Medit.
ANTHOXANTHUM, Linn. Gen. ed. I. 18 (1837).
**A. odoratum*, Linn. Europ. As. bor. Afr. bor.

36. *AMPHIPOGON*, R.Br. Prodr. Fl. Nov. Holl. 175 (1810).
A. debilis, R.Br. Prodr. 175 (1810).
A. strictus, R.Br. l. c. 175.
A. laguroides, R.Br. l. c. 175.
A. cygnorum, Nees in Lehm. Pl. Preiss. ii. 100 (1846).
A. turbinatus, R.Br. Prodr. 175 (1810).
A. restionaceus, R. Pilger, in Engler's Botan. Jahrb. xxxv. 72 (1904).

37. *ARISTIDA*, Linn. Sp. Pl. I. 82 (1753).
A. hygrometrica, R.Br. Prodr. 174 (1810).
A. stipoides, R.Br. l. c. 174.
A. Browniana, Henr.
A. arenaria, Gaud. in Freyc. Voy. Bot. 407 (1826).
A. calycina, R.Br. Prodr. 173 (1810).

38. *STIPA*, Linn. Sp. Pl. ed. II. 78 (1753).
S. elegantissima, Labill. Nov. Holl. Pl. i. 24 t. 29 (1804).
S. juncifolia, Hughes, in Kew Bull. Misc. 11 (1921).
S. eriopus, Benth. Fl. Austr. vii. 570 (1878).
S. tenuifolia, Steud. Syn. Glum. i. 128 (1855).
S. leptophylla, Hughes, in Kew Bull. Misc. 14 (1921).
S. trichophylla, Benth. Fl. Austr. vii. 570 (1878).
S. falcata, Hughes, in Kew Bull. Misc. 14 (1921).
S. arachnopus, Pilg. in Engler's Botan. Jahrb. xxxv. 70 (1904).
S. variabilis, Hughes, in Kew Bull. Misc. 15 (1921).
S. Drummondii, Steud. Syn. Glum. i. 128 (1855).
S. incurva, Hughes, in Kew Bull. Misc. 16 (1926).
S. platychaeta, Hughes, in l. c. 16 (1926).
S. scabra, Lindl. in Mitch. Trop. Austr. 31 (1848).
S. pycnostachya, Benth. Fl. Aust. vii. 568 (1878).
S. hemipogon, Benth. l. c. 569.
S. nobilis, Pilg. in Engler's Botan. Jahrb. xxxv. 70 (1904).
S. semibarbata, R.Br. Prodr. 174 (1810).
S. eremophila, Reader, in Vict. Nat. xvii. 154 (1901).
S. hirsuta, Hughes, in Kew Bull. Misc. 22 (1921).
S. tenuiglumis, Hughes, l. c. 22.
S. elatior, Hughes, l. c. 24.
S. puberula, Steud. Syn. Glum. i. 128 (1848).
S. crinita, Gaud. in Freyc. Voy. Bot. 407 (1826).
S. compressa, R.Br. Prodr. 174 (1810).
S. Mc Alpinei, Reader, in Vict. Nat. xv. 143 (1899).
ORYZOPSIS, Mich. Fl. Bor. Am. i. 51. t. 9 (1803).
**O. miliacea*, (Linn.) Aschers. et Schweinf. (Reg. Medit.)

39. *ECHINOPOGON*, Beauv. Agrost. 42 t. 9. f. 5 (1812).
E. ovatus, (Forst.) Beauv. Agrost. 42. t. 9. f. 5 (1812).
PHLEUM, Linn. Syst. ed. I. (1735).
**P. pratense*, Linn. (Reg. bor. temp.)

40. *ALOPECURUS*, Linn. Syst. ed. i. (1735).
A. geniculatus, Linn. Sp. Pl. 60 (1753).

41. *SPOROBOLUS*, R.Br. Prodr. Fl. Nov. Holl. 169 (1810).
S. virginicus, (Linn.) Kunth. Rev. Gram. i. 68 (1832).
S. indicus, R.Br. Prodr. 170 (1810).
S. pulchellus, R.Br. l. c. 170.
S. Lindleyi, (Steud.) Benth. Fl. Austr. vii. 623 (1878).
S. actinocladus, F.v.M. Fragm. viii. 140 (1874).

42. *POLYPOGON*, Desf. Fl. Atlant. i., 66 (1798).
P. monspeliensis, Desf. Fl. Atlant. i. 66 (1798).
P. fugax, Nees in Steud. Syn. Glum. i. 184 (1855).
P. tenellus, R.Br. Prodr. 173 (1810).
AGROSTIS, Linn. Syst. ed. I. (1735).
**A. alba*, Linn. (Europ.)
**A. venusta*, Trin. (Reg. Medit.)

43. *CALAMAGROSTIS*, Adans. Fam. ii. 31 (1763).
C. aemula, Steud. Nom. ed. ii. i. 249 (1821). (*Deyeuxia Forsteri*, Kunth.)
C. quadriseta, (Labill.) Spreng. Syst. i. 253 (1825). (*Deyeuxia cylindrica*, R.Br.)

44. *DICHELACHNE*, Endl. Prodr. Fl. Norf. 20 (1838).
D. crinita, (Linn. f.) Hook. f. Fl. New Zeal. i. 293 (1853).
D. sciurea, (R.Br.) Hook. f. l. c. 294.
AMMOPHILA, Host Gram. Austr. iv. t. 41 (1809).
**A. arenaria*, (Linn.) Link. (Europ: Amer. bor.).

45. *DIPLOPOGON*, R.Br. Prodr. Fl. Nov. Holl. 176 (1810).
D. setaceus, R.Br. Prodr. 176 (1810).

46. *PENTAPOGON*, R.Br. Prodr. Fl. Nov. Holl. 173 (1810).
P. quadrifidus, (Labill.) Baill. Hist. des pl. xii. 280 (1894). (*P. Billardieri*, R.Br.)
LAGURUS, Linn. Gen. ed. i. 353 (1737).
**L. ovatus*, Linn. (Europ.).

47. *ERIACHNE*, R.Br. Prodr. Fl. Nov. Holl. 183 (1810).
E. squarrosa, R.Br. Prodr. 183 (1810).
E. pauciflora, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 115 (1918).
E. glauca, R.Br. Prodr. 183 (1810).
E. ciliata, R.Br. l. c. 184.
E. aristidea, F.v.M. Fragm. v. 205 (1866).
E. festucacea, F.v.M. l. c. 205.
E. ovata, Nees in Hook. Lond. Journ. Bot. ii. 416 (1843).
E. meliacea, F.v.M. Fragm. v. 205 (1866).
E. nana, Pilg. in Engler's Botan. Jahrb. xxxv. 75 (1904).
E. pallida, (F.v.M.) Benth. Fl. Austr. vii. 631 (1878).
E. scleranthoides, F.v.M. Fragm. viii. 233 (1874).
E. inermis, Pilger, in Engler's Botan. Jahrb. xxxv. 75 (1904).
E. obtusa, R.Br. Prodr. 184 (1810).
AIRA, Linn. Fl. Lapp. 27 (1737).
**A. caryophyllea*, Linn. (Europ. Oriens.).
**A minuta*, Linn. (Europ. Oriens.).

48. *DESCHAMPSIA*, Beauv. Agrost. 91. t. 8 (1812).
D. caespitosa, (Linn.) Beauv. Agrost. 91. t. 8 (1812).
AVENA, Linn. Syst. ed. i. (1735).
**A. fatua*, Linn. (Europ. Oriens. As. bor.).
**A. barbata*, Brotero. (Reg. Mediterr. As. Min, Arab.).
HOLCUS, Linn. Syst. ed. i. (1735).
**H. lanatus*, Linn. (Europ.).

49. *AMPHIBROMUS*, Nees in Hook. Lond. Journ. ii. 420 (1843).
A. nervosus, (R.Br.) Hook. f. Fl. Tasm. ii. pl. clxiii. (1860).

50. *DANTHONIA*, D. C. Fl. Franc. iii. 32 (1805).
D. bipartita, F.v.M. Fragm. i. 160 (1859).
D. penicillata, (Labill) F.v.M. Fragm. viii. 135 (1873).
PENTASCHISTIS, Stapf. in Dyer Fl. Cap. vii. 480 (1899).
**P. Thunbergii*, (Kunth.) Stapf. (Afr. aust.).

51. *PAPPOPHORUM*, Schreb. Gen. Pl. ii. 787 (1791).
P. nigricans, R.Br. Prodr. 185 (1810).

52. *TRIRAPHIS*, R.Br. Prodr. Fl. Nov. Holl. 185 (1810).
T. mollis, R.Br. Prodr. 185 (1810).
T. pungens, R.Br. l. c. 185.
T. bromoides, F.v.M. Fragm. viii. 108 (1874).
T. rigidissima, Pilger in Engler's Jahrb. xxxv. 72 (1904).
T. danthonioides, F.v.M. Fragm. viii. 125 (1874).

53. *ELYTROPHORUS*, Beauv. Agrost. 67 (1812).
E. articulatus, Beauv. Agrost. 67 (1812).

54. *TRIODIA*, R.Br. Prodr. Fl. Nov. Holl. 182 (1810).
T. Mitchelli, Benth. Fl. Austr. vii. 606 (1878).
T. pungens, R.Br. Prodr. 182 (1810).
T. Cunninghamii, Benth. Fl. Austr. vii. 606 (1878).
T. irritans, R.Br. Prodr. 182 (1810).
T. procera, R.Br. l. c. 182.
T. microstachya, R.Br. l. c. 182.

55. *DIPLACHNE*, Beauv. Agrost. 9 (1812).
D. loliiformis, (F.v.M.) Benth. Fl. Austr. vii. 618 (1878).
D. fusca, (Linn.) Beauv. Agrost. 163 (1812).
D. parviflora, (R.Br.) Benth. Fl. Austr. vii. 620 (1878).

56. *PHRAGMITES*, Trin. Fund. Agrost. 134 (1820).
P. vulgaris, (Lam.) Druce, List. Brit. Pl. 81 (1908). (*P. phragmites* (Linn.) Karst); (*P. communis*, Trin.)
LAMARCKIA, Moench. Meth. 201 (1794).
**L. aurea*, (Linn.) Moench. (Reg. Mediterr.)
CYNOSURUS, Linn. Gen. ed. i. 13 (1737).
**C. echinatus*, Linn. (Reg. Mediterr.)
KOELERIA, Pers. Syn. Glum. i. 97 (1805).
**K. phleoides*, Pers. (Reg. Mediterr.)
AVELLINIA, Parlàt. Pl. Nov. 59 (1842).
**A. Michelii* (Savi.) Parlàt. (Italia.)
TRISETUM, Pers. Syn. Glum. i. 97 (1805).
**T pumilum*, Kunth. (Af. austr.).
BRIZA, Linn. Syst. ed. I. (1735).
**B. maxima*, Linn. (Reg. Mediterr.; Af. austr.)
**B. minor*, Linn. (Europ. Oriens; As. bor.)
DACTYLIS, Linn. Gen. ed. II. 29 (1742).
**D. glomerata*, Linn. (Europ.; As. bor.)

57. *ERAGROSTIS*, Beauv. Agrost. 70 (1812).
E. tenella, (Linn.) Roem et Schultz. Syst. Veg. ii. 576 (1817).
E. leptocarpa, Benth. Fl. Austr. vii. 644 (1878).
E. pilosa, (Linn.) Beauv. Agrost. 71 (1812).
E. trichophylla, Benth. Fl. Austr. vii. 644 (1878).
E. diandra, Steud. Synops. Pl. Glum. i. 279 (1855).
E. Brownii, Nees in Steud. Nomencl. Bot. i. 562 (1841).
E. speciosa, Steud. in Synops. Pl. Glum. i. 279 (1855).
E. eriopoda, Benth. Fl. Austr. vii. 648 (1878).
E. setifolia, Nees in Hook. Lond. Journ. ii. 419 (1843).
E. falcata, Gaud. in Freyc. Voy. Bot. 408. t. 25 (1826).
E. Dielsii, Pilger, in Engler's Botan. Jahrb. xxxv. 76 (1904).

58. *ECTROSIA*, R.Br. Prodr. Fl. Nov. Holl. 185 (1810).
E. Schultzii, Benth. Fl. Austr. vii. 633 (1878).
E. leporina, R.Br. Prodr. 186 (1810).
SCHISMUS, Beauv. Agrost. 73. t. 15. f. 4 (1812).
**S. calycinus*, (Linn.) Coss. et Dur. (Reg. Mediterr; Afr. austr.).

59. *POA*, Linn. Gen. Pl. 20 (1737).
P. caespitosa, Forst. Prodr. 89 (1786).
P. Maxwelli, Benth. Fl. Austr. vii. 653 (1878).
P. Drummondiana, Nees in Hook. Lond. Journ. Bot. ii. 418 (1843). (*P. nodosa*, Nees.)
**P. bulbosa*, Linn. (Europ.)
**P. annua*, Linn. (Cosmop.)

60. *GLYCERIA*, R.Br. Prodr. Fl. Nov. Holl. 179 (1810).
G. fluitans, (Linn.) R.Br. Prodr. 179 (1810).
G. stricta, Hook. fil. Fl. Nov. Zeal. i. 304 (1855).
G. ramigera, F.v.M. Fragm. viii. 131 (1874).
G. australasica, Steud. Syn. Glum. i. 286 (1855).

61. *FESTUCA*, Linn. Syst. ed. i. (1735).
F. scirpoidea, F.v.M. Fragm. viii. 129 (1874). (*Schedonorus scirpoideus*, Benth.)
F. littoralis, Labill. Nov. Holl. Pl. i. 22. t. 27 (1804). (*S. littoralis*, Beauv.)
**F. elatior*, Linn. (Europ.; As. bor.)
**F. Myuros*, Linn. (Europ.; Am. et As. bor.).
**F. bromoides*, Linn. (Reg. temp.)
**F. rigida*, (Linn.) Kunth. (Europ. Austr.; Afr. bor.)

62. *BROMUS*, Linn. Syst. Nat. 8 (1735).
**B. maximus*, Desf. (Europ.; Reg. Mediterr. et Caucas.)
**B. Madritensis*, Linn. (Europ.; Afr. bor.; Oriens.)
**B. unioloides*, H.B. et K. (Am. calid.)
B. arenarius, Labill. Nov. Holl. Pl. i. 23. t. 28 (1804).
**B. mollis*, Linn. (Europ.; Afr. et As. bor.)
BRACHYPODIUM, Beauv. Agrost. 100 (1812).
**B. distachyum*, Roem et Schultz. (Reg. Mediterr.; Oriens.)

63. *CYNODON*, Rich. in Pers. Syn. Glum. i. 85 (1805).
C. Dactylon, Rich. in Pers. Syn. Glum. i. 85 (1805).
C. tenellus, R.Br. Prodr. 187 (1810).
C. convergens, F.v.M. Fragm. viii. 113 (1874).

64. *CHLORIS*, Swartz. Nov. Gen. et Sp. Plant. 25 (1788).
C. pectinata, Benth. Fl. Austr. vii. 612 (1878).
C. divaricata, R.Br. Prodr. 186 (1810).
C. acicularis, Lindl. in Mitch. Trop. Austr. 33 (1848).
C. truncata, R.Br. Prodr. 186 (1810).
C. barbata, Swartz. Nov. Gen. et Sp. Pl. 25 (1788).
C. scariosa, F.v.M. Fragm. vi. 85 (1868).
C. pallida, Hack. in Engler's Botan. Jahrb. vi. 244 (1885).
65. *ASTREBLA*, (F.v.M.) Benth. Flora Australiensis, vii. 602 (1878).
A. pectinata, (Lindl.) Benth. Fl. Austr. vii. 602 (1878).
A. elymoides, Bail et F.v.M. Illustr. Queensland Grasses (1878).
A. triticoides, (Lindl.) Benth. Fl. Austr. vii. 602 (1878).
66. *DACTYLOCTENIUM*, Willd. Enum. Hort. Berol. 1029 (1809).
D. australiense, Scribn. (*D. aegyptium*, (L.) Willd.)
67. *ELEUSINE*, Gaertn. Fruct. i. 7 (1788).
E. racemosa, Heyne, in Roth. Nov. Sp. Pl. 80 (1817). (*E. verticillata*, Roxb.)
68. *LEPTOCLOA*, Beauv. Agrost. 71. t. 15 (1812).
L. digitata, (R.Br.) Domin, in Biblioth Bot. lxxxv. 379 (1915). (*L. subdigitata*, Trin.)
LOLIUM, Linn. Syst. ed. I. (1735).
**L. temulentum*, Linn. (Europ.; As. bor.).
**L. perenne*, Linn. (Europ.; As. temp.).
**L. rigidum*, Gaud. (Europ.).
69. *LEPTURUS*, R.Br. Prodr. Fl. Nov. Holl. 207 (1810).
L. cylindricus, Trin. Fund. Agrost. 123 (1820).
70. *AGROPYRON*, Gaertn. in Nov. Comm. Petrop. xiv. I. 539 (1770), (*Agropyrum*, (Beauv).)
A. scabrum, (Labill.) Beauv. Agrost. 102 (1812).
**A. repens*, (Linn.) Beauv. (Reg. temp.).
HORDEUM, (Tourn.) Linn. Syst. ed. I. (1735).
**H. murinum*, Linn. (Europ.; Afr. bor.; Oriens.).
**H. maritimum*, With. (Europ. Afr. bor.; Oriens.).

Cyperaceae.

1. *LIPOCARPHA*, R.Br. in Tuckey's Narrative of an Exped. to Congo 459 (1818).
L. microcephala, (R.Br.) Kunth. Enum. ii. 268 (1837).
2. *CARPHA*, Banks et Soland. in R.Br. Prodr. Fl. Nov. Holl. 230 (1810).
C. gracilipes, C. B. Clarke, in Engler's Botan. Jahrb. xxxv. 81 (1904).
3. *CYPERUS*, (Mich.) Linn. Syst. ed. I. (1735).
Subgenus i. Pycreus.
C. flavescens, Linn. Sp. Pl. 46 (1753). (*Pycreus flavescens*, (Linn.) Nees.)
C. polystachyus, Rottb. descr. et Incon. pl. 39 (1773). (*P. polystachyus* (R.Br.) Beauv.)
C. Hochstetteri, Nees, in Regensb. Fl. 755 (1845). (*P. albomarginatus*, Nees.)
Subgenus ii. Juncellus.
C. pygmaeus, Rottb. descr. et Icon. pl. 20 (1773). (*Juncellus pygmaeus*, (Rottb.) Clarke.)
C. laevigatus, Linn. Mant. 179 (1771). (*J. laevigatus*, (Linn.) C. B Clarke.)
Subgenus iii. Eucyperus.
C. trinervis, R.Br. Prodr. 213 (1810).
C. tenellus, Linn. f. Suppl. 103 (1781).
C. difformis, Linn. Amoen. Acad. iv. 302 (1759).
C. Haspan, Linn. Sp. Pl. 45 (1753).
C. leucocephalus, Retz. observ. v. 11 (1788).
C. vaginatus, R.Br. Prodr. 213 (1810).
C. Iria, Linn. Sp. Pl. 45 (1753).
C. aristatus, Rottb. Descr. et Ic. Pl. 23. t. 6. f. i. (1773) (*C. squarrosus*, Benth.)
C. distans, Linn. fil. Suppl 103 (1781).
C. subulatus, R.Br. Prodr. 217 (1810).
C. sporobolus, R.Br. l. c. 215.
C. stenostachyus, Benth. Fl. Austr. vii. 280 (1878).
C. rotundus, Linn. Sp. Pl. 45 (1753).

Subgenus iv. Mariscus.

C. pennatus, Lam. Illustr. Gen. i. 144 (1799). (*Mariscus albescens*, Gaud.)
C. conicus, (R.Br.) Boeckl. in Schlecht. Linnaea. xxxviii. 371 (1874). (*M. cornicus*, R.Br.)
C. alterniflorus, R.Br. Prodr. 216 (1810). (*M. alterniflorus*, C. B. Clarke.)
C. lucidus, R.Br. l. c. 218. (*M. lucidus*, C. B. Clarke.)
C. Cunninghamii, (C. B. Clarke) Gardner, n. comb. (*M. Cunninghamii*, C. B. Clarke.)
C. fulvus, R.Br. Prodr. 215 (1810). (*M. fulvus*, C. B. Clarke.)
C. Holoschoenus, R.Br. Prodr. 215 (1810). (*M. Holoschoenus*, C. B. Clarke.)
C. carinatus, R.Br. l. c. 216. (*M. carinatus*, C. B. Clarke.)

4. *FUIRENA*, Rottb. Descr. et Icon. 70 (1773).
F. glomerata, Lam. Illustr. Gen. i. 150 (1791).
F. umbellata, Rottb. Descr. et Icon. Pl. 70. t. 19. f. 3 (1773).

5. *SCIRPUS*, Linn. Syst. ed. I. (1735).
S. fluitans, Linn. Sp Pl. 48 (1753).
S. cernuus, Vahl. Enum. ii. 245 (1806). (*S. riparius*, Benth.)
S. Isdellensis, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 123 (1918).
S. antarcticus, Linn. Mant. ii. 181 (1771). (*S. cartilagineus*, Poir.)
S. arenarius, Benth. Fl. Austr. vii. 325 (1878).
S. multicaulis, (F.v.M.) C. B. Clarke, Kew Bull. Misc. Add. ser. vii. 25 (1908).
S. setaceus, Linn. Sp. Pl. 49 (1753).
S. nodosus, Rottb. descr. et Icon. Pl. 52. t. 8 (1773).
S. supinus, Linn. Sp. Pl. 49 (1753).
S. erectus, Poir. Encycl. vi. 761.
S. articulatus, Linn. Sp. Pl. 47 (1753).
S. mucronatus, Linn. l. c. 50.
S. americanus, Pers. Syn. Pl. i. 68 (1805).
S. lacustris, Linn. Sp. Pl. 51 (1753).
S. maritimus, Linn. l. c. 51.
S. littoralis, Schrad. Fl. Germ. i. 142 (1806).
S. Kochii, Maiden et Betche, in Proc. Linn. Soc. N.S.W. xxxiii. 318 (1908).

6. *CROSSLANDIA*, W. V. Fitzgerald, in Journ. Roy. Soc. W.A. iii. 122 (1918).
C. setifolia, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 122 (1918).

7. *ELEOCHARIS*, R.Br. Prodr. Fl. Nov. Holl. 224 (1810).
E. compacta, R.Br. Prodr. 224 (1810).
E. atropurpurea, Kunth. Enum. ii. 151 (1837).
E. Dietrichiana, (Boeckel) C. B. Clarke, Kew Bull. Add. ser. viii. 105 (1908).
E. gracilis, R.Br. Prodr. 224 (1810).
E. acuta, R. Br. Prodr. 224 (1810).

8. *FIMBRISTYLIS*, Vahl. Enum. ii. 285 (1806).
F. tetragona, R.Br. Prodr. 226 (1810).
F. pilifera, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 118 (1918).
F. pterygosperma, R.Br. Prodr. 226 (1810).
F. pauciflora, R.Br. l. c. 225.
F. semilevis, (F.v.M.) C. B. Clarke. Kew. Bull. Misc. Add ser. viii. 24 (1908).
F. cardiocarpa, F.v.M. Fragm. i. 194 (1859).
F. denudata, R.Br. Prodr. 227 (1810).
F. caespitosa, R.Br. l. c. 228.
F. diphylla Vahl. Enum. ii. 289 (1806).
F. aestivalis, Vahl. l. c. ii. 289.
F. ferruginea, Vahl. l. c. ii. 291.
F. subaristata, Benth. Fl. Austr. vii. 314 (1878).
F. solidifolia, F.v.M. Fragm. i. 198 (1859).
F. miliacea, Vahl. Enum. ii. 287 (1806).
F. quinquangularis, Kunth. Enum. ii. 229 (1837).
F. rara, R.Br. Prodr. 227 (1810).
F. capitata, R.Br. l. c. 228.
F. Schultzii, Boeckl. in Linnaea xxxviii. 391 (1874).
F. oligocephala, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 121 (1918).

F. barbata, (Rottb.) Benth. Fl. Austr. vii. 321 (1878).
F. capillaris, (Linn.) A. Gray Man. of Bot. N.U.S. ed. 5. 567 (1867).
F. arthrostyloides, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 121 (1918).

9. *SCHOENUS*, Linn. Corroll. Gen. 2 (1737).
S. cruentus, (Nees) Benth. Fl. Austr. vii. 357 (1878).
S. Benthami, F.v.M. Syst. Cens. Austr. pl. 127 (1882). (*S. compressus*, Benth.)
S. lanatus, Labill. Nov. Holl. Pl. Sp. i. 19. t. 20 (1806).
S. flavus, (Nees) Boeckl. in Linnaea xxxviii. 278 (1874).
S. barbatus, Boeckl. in l. c. 277.
S. curvifolius, (R.Br.) Benth. Fl. Austr. vii. 358 (1878).
S. capitatus, (Nees) F.v.M. Fragm. ix. 58 (1875). (*S. subbulbosus*, Benth.)
S. aphyllus, Boeckl. in Linnaea xxxviii. 279 (1874).
S. sesquispiculus, C. B. Clarke Kew Bull, Misc. Add. Ser. viii. 43 (1908).
S. Drummondii, (Steud.) Benth. Fl. Austr. vii. 359 (1878). (*S. microstachyus*, Nees).
S. nitens, (R.Br.) Poir. Encycl. Suppl. ii. 251 (1811).
S. cygneus, Nees in Lehm. Pl. Preiss. ii. 81 (1846).
S. unispiculatus, (F.v.M.) Benth. Fl. Austr. vii. 365 (1878).
S. breviculmis, Benth. Fl. Austr. vii. 364 (1878).
S. pleiostomoneus, F.v.M. Fragm. ix. 52 (1875).
S. trachycarpus, F.v.M. l. c. 33.
S. nanus, (Nees) Benth. Fl. Austr. vii. 364 (1878).
S. Rodwayanus, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxvii. 243 (1903).
S. minutulus, F.v.M. Fragm. ix. 32 (1875).
S. obtusifolius, (Nees) Boeckel, in Linnaea xxxviii. 281 (1874).
S. grammatophyllus, F.v.M. Fragm. ix. 31 (1875)
S. asperocarpus, F.v.M. l. c. 29.
S. grandiflorus, (Nees) F.v.M. l. c. 30.
S. calostachyus, (R.Br.) Poir. Encyc. Meth. Suppl. ii. 251 (1811).
S. efoliatus, F.v.M. Fragm. ix. 32 (1875).
S. multiglumis, Benth. Fl. Austr. vii. 368 (1878).
S. acuminatus, R.Br. Prodr. 231 (1810).
S. falcatus, R.Br. l. c. 232.
S. laevigatus, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxviii. 111 (1904).
S. caespititius, W. V. Fitzg. l. c. 110.
S. punctatus, R.Br. Prodr. 232 (1810).
S. bifidus (Nees) Boeckl. in Linneae xxxviii. 282 (1874).
S. laxus, W. V. Fitzg. in Proc. Linn. Soc. N.S. Wales xxviii. 111 (1904).
S. Jamisonianus, W. V. Fitzg. l. c. xxvii. 245 (1903).
S. brevifolius, R.Br. Prodr. 231 (1810).
S. pedicellatus, (R.Br.) Benth. Fl. Austr. vii. 369 (1878).
S. fascicularis, Nees in Ann. Nat. Hist. ser. i. vi. 48 (1842).
S. indutus, (F.v.M.) Benth. Fl. Austr. vii. 372 (1878).
S. odontocarpus, F.v.M. Fragm. ix. 32 (1875).
S. sculptus, (Nees) Boeckl. in Linnaea xxxviii. 286 (1874).
S. humilis, Benth. Fl. Austr. vii. 374 (1878).
S. axillaris, (R.Br.) Poir. Encycl. Suppl. ii. 251 (1811).
S. natans, (F.v.M.) Benth. Fl. Austra. vii. 375 (1878).

10. *GYMNOSCHOENUS*, Nees in Ann. Hist. Ser i. vi. 47 (1841).
G. anceps, (R.Br.) C. B. Clarke, Kew Bull. Add. Ser. viii. 92 (1908).

11. *MESOMELAENA*, Nees in Lehm. Pl. Preiss. ii. 88 (1846).
M. stygia, (R.Br.) Nees in Lehm. Pl. Preiss. ii. 89 (1846).
M. Preissii, Nees in l. c. 88.
M. uncinata (Nees) C. B. Clarke in Kew Bull. Add. ser. viii. 48 (1908).
M. tetragona, (R.Br.) F.v.M. Fragm. ix. 36 (1875).

12. *LEPIDOSPERMA*, Labill. Nov. Holl. Pl. i. 14 (1804).
L. gladiatum, Labill. Nov. Holl. Pl. i. 15. t. 12 (1804).
L. effusum, Benth. Fl. Austr. vii. 387 (1878).
L. rupestre, Benth. l. c. 388.
L. tetraquetrum, Nees in Lehm. Pl. Preiss. ii. 90 (1846).
L. longitudinale, Labill. Nov. Holl. Pl. i. 16. t. 13 (1804).
L. exaltatum, R.Br. Prodr. 234 (1810).
L. angustatum, R.Br. l. c. 235.
P. resinosum (Nees) Benth. Fl. Austr. vii. 392 (1878).

L. viscidum, R.Br. Prodr. 234 (1810).
L. Drummondii, Benth. Fl. Austr. vii. 391 (1878).
L. tuberculatum, Nees in Lehm. Pl. Preiss. ii. 90 (1846).
L. Brunonianum, Nees. l. c. 92.
L. costale, Nees. l. c. 92.
L. aphyllum, R.Br. Prodr. 235 (1810).
L. Benthamianum, C. B. Clarke, Kew Bull. Add. ser. viii. 91 (1908).
L. pubisquameum, Steud. Syn. Glum. ii. 158 (1855).
L. scabrum, Nees in Lehm. Pl. Preiss. ii. 92 (1846).
L. gracile, R.Br. Prodr. 235 (1810).
L. tenue, Benth. Fl. Austr. vii. 397 (1878).
L. leptostachyum, Benth. l. c. 397.
L. leptophyllum, Benth. l. c. 398.
L. striatum, R.Br. Prodr. 235 (1810).
L. Exsul. C. B. Clarke, Kew Bull. Add. ser. viii. 47 (1908).
L. carphoides, (F.v.M.) Benth. Fl. Austr. vii. 400 (1878).

13. *TRICOSTULARIA*, Nees in Lehm. Pugill. viii. 50 (1844).
T. compressa, Nees in Lehm. Pl. Preiss. ii. 83 (1846).
T. Neesii, Lehm. in l. c. 83.

14. *REEDIA*, F.v.M. Fragm. i. 240. t. 10 (1859).
R. spathacea, F.v.M. Fragm. i. 240. t. 10 (1859).

15. *CLADIUM*, P. Br. Hist. Jamaic. 114 (1756).
C. Drummondii, C. B. Clarke, Kew Bull. Add. ser. viii. 91 (1908).
C. Preissii, (Nees) Benth. Fl. Austr. vii. 405 (1878).
C. laxum, (Nees) Benth. l. c. 405.
C. riparium, (Nees) Benth. l. c. 405.
C. schoenoides, R.Br. Prodr. 237 (1810).
C. arthrophyllum, (Nees) F.v.M. Fragm. ix. 14 (1875).
C. glomeratum, R.Br. Prodr. 237 (1810).
C. elynanthoides, F.v.M. Fragm. ix. 31 (1875).
C. vaginale, Benth. Fl. Austr. vii. 408 (1878).
C. junceum, R.Br. Prodr. 237 (1810).

16. *RHYNCHOSPORA*, Vahl. Enum. ii. 229 (1806).
R. affinis, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 124 (1918).
R. tenuifolia, Benth. Fl. Austr. vii. 350 (1878).

17. *CYATHOCHAETE*, Nees in Lehm. Pl. Preiss. ii. 86 (1846).
C. clandestina, (R.Br.) Benth. Fl. Austr. vii. 351 (1878).
C. australis, (Steud.) Gardner n. comb.
C. teretifolia, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxviii. 109 (1904).

18. *TETRARIA*, P. Beauv. in Mem Inst. Fr. (Acad Sc. Par) 1812 ii. 54 (1816.)
T. australiensis, C. B. Clarke, in Engler's Botan. Jahrb. xxxv. 80 (1904).

19. *TETRARIOPSIS*, C. B. Clarke, Kew Bull. Add. ser. viii. 45 (1908).
T. octandra, (Nees) C. B. Clarke in Engler's Botan. Jahrb. xxxv. 81 (1904).

20. *GAHNIA*, R et G Forst. Char. Gen. 51 (1776).
G. trifida, Labill. Nov. Holl. Pl. i. 89. t. 116 (1804).
G. polyphylla, Benth. Fl. Austr. vii. 415 (1878).
G. deusta, (R.Br.) Benth. l. c. 416.
G. aristata, (F.v.M.) Benth. l. c. 416.
G. lanigera, (R.Br.) Benth. l. c. 415.

21. *CAUSTIS*, R.Br. Prodr. Fl. Nov. Holl. 239 (1810).
C. pentandra, R.Br. Prodr. 240 (1810).
C. dioica, R. Br. l. c. 239.
C. squamellata, C. B. Clarke, Kew Bull. Add. Ser. viii. 48 (1908).

22. *EVANDRA*, R.Br. Prodr. Fl. Nov. Holl. 239 (1810).
E. aristata, R.Br. Prodr. 239 (1810).
E. pauciflora, R.Br. l. c. 239.

23. *CHRYSITHRIX*, Linn. Mant. ii. 165 (1771).
C. dimerostigma, C. B. Clarke, in Engler's Botan. Jahrb. xxxv. 82 (1904).

24. *CHORISANDRA*, R.Br. Prodr. Fl. Nov. Holl. 221 (1810).
C. enodis, Nees in Lehm. Pl. Preiss. ii. 73 (1846).
C. multiarticulata, Nees in Ann. Nat. Hist. ser. i. iv. 48.
C. cymbaria, R.Br. Prodr. 221 (1810).

25. *CAREX*, Linn. Syst. ed. I. (1735).
C. inversa, R.Br. Prodr. 242 (1810).
C. appressa, R.Br. Prodr. 242 (1810).
C. tereticaulis, F.v.M. Fragm. viii. 256 (1874).
C. Preissii, Nees in Lehm. Pl. Preiss. ii. 94 (1846).
C. pseudocyperus, Linn. Sp. Pl. 978 (1753).
SCHOENUS Andrewsii, W. V. Fitzg. This species, if a valid Schoenus, is not sufficiently described to place it in the sequential list given for that genus.

PRINCIPES.

Palmae.

1. *LIVISTONA*, R.Br. Prodr. Fl. Nov. Holl. 267 (1810).
L. Alfredi, F.v.M. in Vict. Nat. ix. 112 (1892).
L. Eastoni, Gardner, in Bull. For. Dep. xxxii. 36 (1923).
L. inermis, R.Br. Prodr. 268 (1810).

SPATHIFLORAE.

Araceae.

1. *COLOCASIA*, Schott, Meletem. i. 18 (1832).
C. antiquorum, Schott, Meletem. bot. 18 (1832).
ZANTEDESCHIA, Spreng. Syst. iii. 765. (1826). (*Richardia*, Kunth.)
**Z. aethiopica*, Spreng. l. c. (Afr. austr). (R. *africana*.)
**R. africana*, Kunth. (Afr. austr.)
2. *TYPHONIUM*, Schott, in Wienen Zeitschr. iii. 72 (1829).
T. angustilobium, F.v.M. Fragm. x. 66 (1876).

Lemnaceae.

1. *LEMNA*, Linn. Syst. ed. I. (1735).
L. trisulca, Linn. Sp. Pl. 970 (1753).
L. minor, Linn. l. c. 970.
L. gibba, Linn. l. c. 970.
L. disperma, Hegelm. in Engler's Botan. Jahrb. xxi. 290 (1895).

FARINOSAE.

Flagellariaceae.

1. *FLAGELLARIA*, Linn. Amoen. Acad. 396 (1747).
F. indica, Linn. Sp. Pl. 333 (1753).

Restionaceae.

1. *LYGINIA*, R.Br. Prodr. Fl. Nov. Holl. 248 (1810).
L. tenax, (Labill) Gardner n. comb. (*L. barbata*, R.Br.)
2. *ECDEIOCOLEA*, F.v.M. Fragm. Phyt. Austr. viii. 236 (1874).
E. monostachya, F.v.M. Fragm. viii. 236 (1874).
3. *ANARTHRIA*, R.Br. Prodr. Fl. Nov. Holl. 248 (1810).
A. scabra, R.Br. Prodr. 249 (1810).
A. laevis, R.Br. l. c. 249.
A. gracilis, R.Br. l. c. 249.
A. prolifera, R.Br. l. c. 249.
A. polyphylla, Nees in Lehm. Pl. Preiss. ii. 63 (1846).
4. *LEPYRODIA*, R.Br. Prodr. Fl. Nov. Holl. 247 (1810).
L. hermaphrodita, R.Br. Prodr. 248 (1810).
L. monoica, F.v.M. Fragm. viii. 76 (1873).
L. Muirii, F.v.M. l. c. 78.
L. heleocharoides, Gilg. in Engler's Botan. Jahrb. xxxv. 87 (1904).
L. stricta, R.Br. Prodr. 248 (1810).
L. macra, Nees in Lehm. Pl. Preiss. ii. 60 (1846).
L. Drummondiana, Steud. Syn. Glum. ii. 248 (1855).
L. glauca, (Nees) F.v.M. Fragm. viii. 77 (1873).
L. anaectocolea, F.v.M. Fragm. viii. 78 (1873).

5. *RESTIO*, Linn. Syst. Nat. ed. 12. ii. 735 (1767).
R. megalotheca, F.v.M. Fragm. viii. 99 (1873).
R. applanatus, Spreng. Syst. i. 185 (1825).
R. confertospicatus, Steud. Syn. Glum. ii. 256 (1855).
R. sphacelatus, R.Br. Prodr. 246 (1810).
R. deformis, R.Br. l. c. 245.
R. stenostachyus, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxviii. 108 (1904).
R. crispatus, R.Br. Prodr. 246 (1810).
R. nitens, Nees in Lehm. Pl. Preiss. ii. 59 (1846).
R. gracilior, (F.v.M.) Benth. Fl. Austr. vii. 226 (1878).
R. chaunocoleus, F.v.M. Fragm. viii. 64 (1873).
R. laxus, R. Br. Prodr. 245 (1810).
R. ornatus, Steud. Syn. Glum. ii. 256 (1855).
R. leucoblephara, Gilg, in Engler's Botan. Jahrb. xxxv. 88 (1904).
R. leptocarpoides, Benth. Fl. Austr. vii. 229 (1878).
R. amblycoleus, F.v.M. Fragm. viii. 65 (1873).
R. Dielsii, Gilg, in Engler's Botan. Jahrb. xxxv. 88 (1904).
R. tremulus, R.Br. Prodr. 245 (1810).

6. *DIELSIA*, Gilg, in Engler's Botan. Jahrb. xxxv. 88 (1904).
D. cygnorum, Gilg, in Engler's Botan. Jahrb. xxxv. 88 (1904).

7. *HOPKINSIA*, W. V. Fitzg. in Journ. W.A. Nat. Hist. Soc. i. 33 (1904).
H. calovaginata, (Gilg.) Pilger in Engler's Pflanzenfam. Nachtrage iii. zu. ii. 4. 35 (1908). (*H. scabrida*, W. V. Fitzg.)

8. *LEPTOCARPUS*, R.Br. Prodr. Fl. Nov. Holl. 250 (1810).
L. scariosus, R.Br. Prodr. 250 (1810).
L. tenax, (Labill) R. Br. Prodr. 250 (1810).
L. Brownii, Hook. f. Fl. Tasm. ii. 73. t. 136 (1860).
L. canus, Nees in Ann. Hist. ser. 1. vi. 50 (1843).
L. coangustatus, Nees in Lehm. Pl. Preiss. ii. 65 (1846).
L. humilis, Gilg. in Engler's Botan. Jahrb. xxxv. 89 (1904).
L. aristatus, R.Br. Prodr. 250 (1810).
L. erianthus, Benth. Fl. Austr. vii. 235 (1878).

9. *LOXOCARYA*, R.Br. Prodr. Fl. Nov. Holl. 249 (1810).
L. myrioclada, Gilg, in Engler's Botan. Jahrb. xxxv. 90 (1904).
L. densa (Nees) Benth. Fl. Austr. vii. 241 (1878).
L. vestita, Benth. l. c. 241.
L. virgata, Benth. l. c. 242.
L. pubescens, (R.Br.) Benth. l. c. 242.
L. fasciculata, (R.Br.) Benth. l. c. 242.
L. flexuosa, (R.Br.) Benth. l. c. 243.
L. cinerea, R.Br. Prodr. 249 (1810).

10. *HARPERIA*, W. V. Fitzg. in Journ. W.A. Nat. Hist. Soc. i. 34 (1904).
H. lateriflora, W. V. Fitzg. in Journ. W.A. Nat. Hist. Soc. i. 35 (1904).

11. *LEPIDOBOLUS*, Nees in Lehm. Pl. Preiss ii. 66 (1846).
L. Preissianus, Nees in Lehm. Pl. Preiss. ii. 66 (1846).
L. chaetocephalus, F.v.M. Fragm viii. 84 (1873).
L. deserti, Gilg in Engler's Botan. Jahrb. xxxv. 91 (1904).

12. *CHAETANTHUS*, R.Br. Prodr. Fl. Nov. Holl. 251 (1810).
C. leptocarpoides, R.Br. Prodr. 251 (1810).

13. *ONYCHOSEPALUM*, Steud. Syn. Pl. Glum. ii. 249 (1855).
O. laxiflorum, Steud. Syn. Glum. ii. 249 (1855).

14. *HYPOLAENA*, R.Br. Prodr. Fl. Nov. Holl. 251 (1810).
H. ramosissima, Gilg, in Engler's Botan. Jahrb. xxxv. 89 (1904).
H. fasciculata, W. V. Fitzg, in Proc. Linn. Soc. N.S.W. xxviii. 108 (1904).
H. gracillima, (F.v.M.) Benth. Fl. Austr. vi. 239 (1878).
H. exsulca, R.Br. Prodr. 251 (1810).

Centrolepidaceae.

1. *HYDATELLA*, Diels, in Engler's Botan. Jahrb. xxxv. 93 (1904).
   H. australis Diels, in Engler's Jahrb. xxxv. 93 (1904).
   H. leptogyne, Diels, in l. c. 93.
2. *TRITHURIA*, Hook. fil. Fl. Tasm. ii. 79. t. 137 (1860).
   H. submersa, Hook. fil. Fl. Tasm. ii. 79. t. 138 (1860). (*T. occidentalis*, Benth.)
   T. bibracteata, Stapf.
   T. micranthera, Stapf.
3. *BRIZULA*, Heiron. in Bot. Zeit. xxx. 206 (1872).
   B. nutans, (Hook. f.) Gardner. n. comb.
   B. gracilis, (Sond.) Hieron. in Abb. Naturf. Ges. Halle xii. 92 (1873). (*Aphelia gracilis*, Sond.)
   B. Drummondii, Hieron. l. c. 92.
   B. Muelleri, Hieron. l. c. 93.
4. *APHELIA*, R.Br. Prodr. Fl. Nov. Holl. 251 (1810).
   A. cyperoides, R.Br. Prodr. 252 (1810).
5. *CENTROLEPIS*, Labill. Nov. Holl. Pl. i. 7 (1804).
   C. humillima, (F.v.M.) Benth. Fl. Austr. vii. 203 (1878).
   C. polygyna, (R.Br.) Hieron. Centrop. in Abh. Nat. Ges Halle. xii. 96 (1873).
   C. alepyroides, (Nees) Hieron. l. c. 96.
   C. mutica, (R.Br.) Hieron. l. c. 96.
   C. glabra, (F.v.M.) Hieron. l. c. 96.
   C. aristata, (R.Br.) Roem. et Schultz. Syst. Veg. i. 44 (1817).
   C. basiflora, Ostf. Det. Kgl. Danske Vidensk. Selskab. iii. 2. 13 (1921).
   C. inconspicua, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxviii. 107 (1904).
   C. Drummondii, (Nees) Hieron. Centrop. in Abh. Nat. Ges Halle. xii. 98 (1873).
   C. Banksii, (R.Br.) Roem. et Schultz. Syst. Veg. i. 44 (1817).
   C. pilosa, Hieron. Centrop. in Abh. Nat. Ges. Halle 102 (1873).
   C. strigosa, (R.Br.) Roem. et Schultz, Syst. Veg. i. 43 (1817).
   C. exserta, (R.Br.) Roem. et Schultz. l. c. 44.

Xyridaceae.

1. *XYRIS*, Linn. Gen. Pl. ii. (1737).
   X. complanata, R.Br. Prodr. 256 (1810).
   X. pauciflora, Willd. Phyt. 2. t. 1 (1794).
   X. lacera, R.Br. Prodr. 257 (1810).
   X. flexifolia, R.Br. l. c. 256.
   X. lanata, R.Br. l. c. 257.
   X. laxiflora, F.v.M. Fragm. viii. 203 (1874).
   X. gracillima, F.v.M. l. c. 203.

Eriocaulaceae.

1. *ERIOCAULON*, Linn. Gen. Pl. ed. 2. 35 (1742).
   E. setaceum, Linn. Sp. Pl. 87 (1753).
   E. quinquangulare, Linn. l. c. 87.
   E. cinereum, R.Br. Prodr. 254 (1810).
   E. nigricans, R.Br. l. c. 254.
   E. lividum, F.v.M. Fragm. i. 92 (1858).

Commelinaceae.

1. *CYANOTIS*, D. Don. Prodr. Fl. Nep. 45 (1825).
   C. axillaris, D. Don. Prodr. Fl. Nep. 46 (1825).
2. *COMMELINA*, (Plum.) Linn. Syst. ed. I. (1735).
   C. ensifolia, R.Br. Prodr. 269 (1810).
   C. lanceolata, R.Br. l. c. 269.
3. *ANEILEMA*, R.Br. Prodr. Fl. Nov. Holl. 270 (1810).
   A. gramineum, R.Br. Prodr. 270 (1810).
4. *CARTONEMA*, R.Br. Prodr. Fl. Nov. Holl. 271 (1810).
   C. philydroides, F.v.M. Fragm. i. 62 (1858).
   C. spicatum, R.Br. Prodr. 271 (1810).
   C. parviflorum, Hassk. Flora Regensb. 365 (1869).

Pontederiaceae.

1. *MONOCHORIA*, Presl. Reliq. Haenk. i. 127 (1827).
   M. cynea, F.v.M. Fragm. viii. 44 (1872).

Philydraceae.

1. *PHILYDRUM*, Banks in Gaertn. Fruct. i. 62 (1788).
   P. lanuginosum, Banks in Gaertn. Fruct. i. 62 (1788).
2. *PRITZELIA*, F.v.M. Papuan Plants. 13 (1875).
   P. pygmaea, (R.Br.) F.v.M. Papuan Plants 13 (1875).

Juncaceae.

1. *JUNCUS*, Linn. Gen. Pl. ed. i. 104 (1737).
   J. gracilis, R.Br. Prodr. 259 (1810).
   J. planifolius, R.Br. l. c. 259.
   J. caespititius, E. Mey. in Lehm. Pl. Preiss. ii. 47 (1846).
   J. bufonius, Linn. Sp. Pl. 328 (1753).
   J. plebius, R.Br. Prodr. 259 (1810). (*J. homalocaulis*, F.v.M.)
   J. effusus, Linn. Sp. Pl. ed. i. 326 (1753). (*J. communis*, E. Mey.)
   J. pallidus, R.Br. Prodr. 258 (1810).
   J. radula, Buchenau Krit. Verzeichn. aller Juncac. 38 (1880).
   J. maritimus, Lam. Encycl. Meth. iii. 264 (1789).
   J. polyanthemus, Buchen, in Engler's Botan. Jahrb. xx. 261 (1895).
   J. holoschoenus, R.Br. Prodr. 259 (1810).
2. *LUZULA*, D. C. Fl. France, iii. 158 (1805).
   L. campestris, D. C. Fl. France, iii. 161 (1805).

Liliaceae.

1. *BURCHARDIA*, R.Br. Prodr. Fl. Nov. Holl. 272 (1810).
   B. umbellata, R.Br. Prodr. 273 (1810).
   B. multiflora, Lindl. Swan Riv. App. 58 (1839).
2. *WURMBAEA*, Thunb. Nov. Gen. i. 18. t. 1 (1781). (*Anguillaria*, R.Br. p.p.)
   W. tubulosa, Benth. Fl. Austr. vii. 28 (1878).
   W. pygmaea (Endl.) Benth. l. c. 28.
   W. dioica, (R.Br.) F.v.M. Fragm. x. 119 (1877).
3. *IPHIGENIA*, Kunth, Enum. Pl. iv. 212 (1843).
   I. indica, Kunth. enum. Pl. iv. 213 (1843).

   ASPHODELUS, (Tourn.) Linn. Syst. ed. I. (1735).
   **A. fistulosus*, Linn. (Reg. Mediterr.; Oriens.)
4. *BULBINE*, Linn. Hort. Cliff. 122 (1737).
   B. semibarbata, (R.Br.) Haw. Rev. Pl. Succul. 33 (1821).
5. *THYSANOTUS*, R.Br. Prodr. Fl. Nov. Holl. 282 (1810).
   T. multiflorus, R.Br. Prodr. 285 (1810).
   T. triandrus, (Labill) R.Br. l. c. 284.
   T. Bentianus, Ewart et J. White, in Proc. Roy. Soc. Vict. n. s. xxi. 546 (1909).
   T. glaucus, Endl. in Lehm. Pl. Preiss. ii. 38 (1846).
   T. Drummondii, Baker in Journ. Linn. Soc. xv. 341 (1876).
   T. pauciflorus, R.Br. Prodr. 285 (1810).
   T. asper, Lindl. Swan Riv. App. 58 (1839).
   T. gageoides, Diels, in Engler's Botan. Jahrb. xxxv. 99 (1904).
   T. chinensis, Benth. Fl. Hong kong. 37 (1861). (*T. chrysantherus*, F.v.M.)
   T. isantherus, R.Br. Prodr. 283 (1810)
   T. tenellus, Endl. in Lehm. Pl. Preiss. ii. 37 (1846).
   T. scaber, Endl. in l. c. 37.
   T. tuberosus, R.Br. Prodr. 282 (1810).
   T. thyrsoides, Baker, in Journ. Linn. Soc. xv. 336 (1876).
   T. Patersoni, R.Br. Prodr. 284 (1810).
   T. dichotomus, (Labill) R.Br. l. c. 284.
   T. arbuscula, Baker, in Journ. Linn. Soc. xv. 339 (1876).
   T. anceps, Lindl. Swan Riv. App. 58 (1839).
6. *DICHOPOGON*, Kunth. Enum. Pl. iv. 622 (1843).
   D. strictus, (R.Br.) J. G. Baker in Journ. Linn. Soc. xv. 319 (1876).
   D. fimbriatus (R.Br.) Macbride in Contr. Gray Herb. in. s. lvi. 2 (1918). (*D. Sieberianus*, Kunth.)

7. *ARTHROPODIUM*, R.Br. Prodr. Fl. Nov. Holl. 276 (1810).
A. capillipes, Endl. in Lehm. Pl. Preiss. ii. 34 (1846).
A. Preissii, Endl. in l. c. 35.

8. *CHAMAESCILLA*, F.v.M. Fragm. vii. 68 (1870).
C. corymbosa, (R.Br.) F.v.M. Fragm. vii. 68 (1870).
C. spiralis, (Endl.) F.v.M. l. c. 68.

9. *TRICORYNE*, R.Br. Prodr. Fl. Nov. Holl. 278 (1810).
T. elatior, R.Br. Prodr. 278 (1810).
T. humilis, Endl. in Lehm. Pl. Preiss. ii. 36 (1846).

10. *AGROSTOCRINUM*, F.v.M. Fragm. Phyt. Austr. ii. 95 (1860).
A. scabrum (R.Br.) Baill. in Bull. Soc. Linn. Par. ii. 1119 (1893). (*A. stypandroides*, F.v.M.)

11. *CAESIA*, R.Br. Prodr. Fl. Nov. Holl. 277 (1810).
C. vittata, R.Br. Prodr. 277 (1810).
C. parviflora, R.Br. l. c. 277.
C. rigidifolia, F.v.M. Fragm. x. 48 (1876).

12. *CORYNOTHECA*, F.v.M. Fragm. Phyt. Austr. vii. 68 (1870).
C. lateriflora, (R.Br.) F.v.M. Fragm. vii. 68 (1870).
C. micrantha, (Lindl.) Macbride, Contr. Grey. Herb. lvi. 3 (1918). (*C. dichotoma*, F.v.M.)
C. acanthoclada, F.v.M. Fragm. vii. 68 (1870).

13. *HODGSONIOLA*, F.v.M. Fragm. Phyt. Austr. ii. 176 (1861).
H. junciformis, F.v.M. Fragm. ii. 176 (1861).

14. *STYPANDRA*, R.Br. Prodr. Fl. Nov. Holl. 278 (1810).
S. imbricata, R.Br. Prodr. 279 (1810).
S. grandiflora, Lindl. Swan Riv. App. 57 (1839).

15. *DIANELLA*, Lam. Encycl. Mèth. ii. t. 250 (1786).
D. revoluta, R.Br. Prodr. 280 (1810)
D. coerulea, Sims. Bot. Mag. t. 505 (1799).

16. *BARTLINGIA*, F.v.M. Fragm. vii. 88 (1870). (*Laxmannia*, R.Br. **non** Forst.)
B. grandiflora, (Lindl.) F.v.M. Cens. Austr. Pl. 118 (1882).
B. squarrosa, (Lindl.) F.v.M. l. c. 118
B. minor, (R.Br.) F.v.M. l. c. 118.
B. ramosa, (Lindl.) F.v.M. Fragm. vii. 88 (1870).
B. sessiliflora, (Dene) F.v.M. in Proc. Roy. Soc. Tasm. 116 (1877).
B. brachyphylla, F.v.M. Cens. Austr. P. 119 (1882).
B. sessilis, (Lindl.) F.v.M. l. c. 119.

17. *SOWERBAEA*, Smith. in Trans. Linn. Soc. v. 159 (1800).
S. multicaulis, E. Pritzel, in Engler's Jahrb. xxxv. 99 (1904).
S. laxiflora, Lindl. Bot. Reg. t. 10 (1841).

18. *STAWELLIA*, F.v.M. Fragm. Phyt. Austr. vii. 85 (1870).
S. dimorphantha, F.v.M. Fragm. vii. 85 (1870).
S. gymnocephala, Diels, in Engler's Jahrb. xxxv. 100 (1904).

19. *BORYA*, Labill. Nov. Holl. Pl. Sp. i. 81 t. 107 (1804).
B. nitida, Labill. Nov. Holl. Pl. Sp. i. 81. t. 107 (1804).
B subulata Gardner Bull. For. Dep. xxxii. 38 (1923).

20. *JOHNSONIA*, R.Br. Prodr. Fl. Nov. Holl. 287 (1810).
J. lupulina, R.Br. Prodr. 287 (1810).
J. pubescens, Lindl. Swan. Riv. App. 57 (1839).
J. acaulis, Endl. in Lehm. Pl. Preiss. ii. 41 (1846).

21. *HENSMANIA*, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxviii. 105 (1903).
H. turbinata, (Endl.) W. V. Fitzg in Proc. Linn. Soc. N.S.W. xxviii. 106 (1903).

22. *ARNOCRINUM*, Endl. in Lehm. Pl. Preiss. ii. 41 (1846).
A. Drummondii, Endl. in. Lehm. Pl. Preiss. ii. 41 (1846).
A. Preissii, Lehm. in l. c. 42.

23. *DASYPOGON*, R.Br. Prodr. Fl. Nov. Holl. 263 (1810).
D. bromeliaefolius, R.Br. Prodr. 263 (1810).
D. Hookeri, Drumm. in Hook. Lond. Journ. Bot. ii. 168 (1843).

24. *ACANTHOCARPUS*, Lehm. in Lehm. Pl. Preiss. ii. 274 (1847).
A. Preissii, Lehm. in Lehm. Pl. Preiss. ii. 274 (1847).
A. serra, (Endl.) Ewart, Proc. Roy. Soc. Vict. xxviii. n. s. 220 (1916).
A. fimbriata, (F.v.M.) Ewart, l. c. 220.

25. *LOMANDRA*, Labill. Nov. Holl. Pl. Sp. i. 92 (1804). (*Xerotes*, R.Br.)
L. rigida, Labill. Nov. Holl. Pl. Sp. i. 93. t. 120 (1804).
L. Drummondii, (F.v.M.) Ewart, in Proc. Roy. Soc. Vict. xxviii. n. s. 219 (1916).
L. Sonderi, (F.v.M.) Ewart, l. c. 219.
L. odora, (Endl.) Ewart, l. c. 219.
L. multiflora, (R.Br.) J. Britt. in Bot. Cook's Voy. 95 (1905).
L. Ordii, (F.v.M.) Ewart in Proc. Roy. Soc. Vict. xxviii. n. s. 219 (1916).
L. Endlicheri, (F.v.M.) Ewart, l. c. 219.
L. sericea, (Endl.) Ewart, l. c. 219.
L. purpurea, (Endl.) Ewart, l. c. 219.
L. Preissii, (Endl.) Ewart, l. c. 219.
L. effusa, (Lindl.) Ewart, l. c. 219.
L. micrantha, (Endl.) Ewart, l. c. 219.
L. caespitosa, (Benth.) Ewart, l. c. 220.
L. hermaphrodita, (C. Andrews) Gardner. n. comb.
L. pauciflora, (R.Br.) Ewart, in Proc. Roy. Soc. Vict. xxviii. n. s. 219 (1916).
L. glauca, (R.Br.) Ewart, l. c. 220.
L. rupestris, (Endl.) Ewart, l. c. 220.
L. collina, (R.Br.) Ewart, l. c. 220.
L. suaveolens, (Endl.) Ewart, l. c. 220.
L. spartea, (Endl.) Ewart, l. c. 220.
L. leucocephala, (R.Br.) Ewart, l. c. 220.
L. hastilis, (R.Br.) Ewart, l. c. 220.

26. *XANTHORRHOEA*, Smith, in Trans. Linn. Soc. iv. 219 (1798).
X. gracilis, Endl. in Lehm. Pl. Preiss. ii. 39 (1847).
X. reflexa, Herbert, in Journ. Roy. Soc. W.A. vi. pt. i. 33 (1920).
X. brevistyla, Herbert, l. c. vii. 82 (1921).
X. Preissii, Endl. in Lehm. Pl. Preiss. ii. 39 (1847).
X. nana, Herbert, in Journ. Roy. Soc. W.A. vii. 83 (1921).

27. *KINGIA*, R.Br. in King's Narr. and Surv. Austr. Coasts, ii. 529 (1827).
K. australis, R.Br. in l. c. ii. 535, t. c. (1827).

28. *BAXTERIA*, R.Br. in Hook. Lond. Journ. Bot ii. 492. t. 13-15 (1843).
B. australis, R.Br. in Hook. Lond. Journ. Bot. ii. 492. t. 13-15 (1843).

29. *CALECTASIA*, R.Br. Prodr. Fl. Nov. Holl. 263 (1810).
C. cyanea, R.Br. Prodr. 264 (1810).

30. *ASPARAGUS*, (Tourn.) Linn. Syst. ed. I. (1735).
A. racemosus, Willd. Sp. Pl. ii. 152 (1799).

31. *RHIPOGONUM*, Forst. Char. Gen. 49. t. 25 (1776).
R. album, R.Br. Prodr. 293 (1810).

Haemodoraceae.

1. *HAEMODORUM*, Smith, in Trans. Linn. Soc. 213 (1798).
H. sparsiflorum, F.v.M. Fragm. vii. 117 (1870).
H. spicatum, R.Br. Prodr. 300 (1810).
H. brevisepalum, Benth. Fl. Austr. vi. 420 (1873).
H. paniculatum, Lindl. Swan Riv. App. 44 (1839).
H. laxum, R.Br. Prodr. 300 (1810).
H. simplex, Lindl. Swan Riv. App. 44 (1839).
H. simulans, F.v.M. Fragm. vii. 117 (1870).
H. longifolium, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 127 (1918).
H. flaviflorum, W. V. Fitzg. in l. c. 128.
H. parviflorum, Benth. Fl. Austr. vi. 423 (1873).

2. *PHLEBOCARYA*, R.Br. Prodr. Fl. Nov. Holl. 301 (1810).
P. ciliata, R.Br. Prodr. 301 (1810).
P. pilosissima, (F.v.M.) Benth. Fl. Austr. vi. 425 (1873).
P. filifolia, (F.v.M.) Benth. l. c. 425.

Amaryllidaceae.

1. *CRINUM*, Linn. Gen. Pl. 97 (1737).
   C. asiaticum, Sp. Pl. 292 (1753).

2. *HYPOXIS*, Linn. Syst. ed. x. 986 (1759).
   H. glabella, R.Br. Prodr. 289 (1810).
   H. occidentalis, Benth. Fl. Austr. vi. 451 (1873).
   H. leptantha, Benth. l. c. 451.

3. *MACROPIDIA*, Drumm. e. Harv. in Hook. Kew Journ. vii. 57 (1855).
   M. fuliginosa, (Hook) Druce in Rep. Bot. Exch. Cl. Brit. Isles, 1916, 634 (1917). (*M. fumosa*, Drumm.)

4. *TRIBONANTHES*, Endl. Nov. Stirp. dec. i. 27 (1839).
   T. brachypetala, Lindl. Swan Riv. App. 44 (1839).
   T. uniflora, Lindl. l. c. 44.
   T. australis, Endl. Nov. Stirp. dec. i. 27 (1839).
   T. variabilis, Lindl. Swan Riv. App. 44 (1839).
   T. longipetala, Lindl. l. c. 44.

5. *BLANCOA*, Lindl. Swan Riv. App. 45 (1839).
   B. canescens, Lindl. Swan Riv. App. 45 (1839).

6. *CONOSTYLIS*, R.Br. Prodr. Fl. Nov. Holl. 300 (1810).
   C. Androstemma, F.v.M. Fragm. viii. 19 (1873). (*A. junceum*, Lindl. 1839.)
   C. Bealiana, F.v.M. Fragm. ix. 50 (1875).
   C. filifolia, F.v.M. l. c. viii. 18 (1873).
   C. spinuligera, (F.v.M.) Benth. Fl. Austr. vi. 438 (1873).
   C. bromelioides, Endl. in Lehm. Pl. Preiss. ii. 18 (1846).
   C. phathyrantha, Diels, in Engler's Botan. Jahrb. xxxv. 111 (1904).
   C. aculeata, R.Br. Prodr. 300 (1810).
   C. laxiflora, Benth, Fl. Austr. vi. 439 (1873).
   C. cymosa, (F.v.M.) Benth. l. c. 439.
   C. Harperiana, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxviii. 106 (1904).
   C. serrulata, R.Br. Prodr. 300 (1810).
   C. caricina, Lindl. Swan Riv. App. 45 (1839).
   C. gladiata, Benth. Fl. Austr. vi. 434 (1873).
   C. seorsiflora, F.v.M. Fragm. i. 158 (1859).
   C. teretiuscula, F.v.M. l. c. viii. 18 (1872).
   C. stylidioides, F.v.M. l. c. 17.
   C. prolifera, Benth. Fl. Austr. vi. 436 (1873).
   C. racemosa, Benth. l. c. 436.
   C. candicans, Endl. Nov. Stirp. dec. 20 (1839).
   C. dealbata, Lindl. Swan Riv. App. 45 (1839).
   C. Preissii, Endl. in Lehm. Pl. Preiss. ii. 18 (1846).
   C. robusta, Diels. in Engler's Botan. Jahrb. xxxv. 109 (1904).
   C. bracteata, Engl. in Lehm. Pl. Preiss. ii. 16 (1846).
   C. involucrata, Endl. l. c. 23.
   C. juncea, Endl. Nov. Stirp. dec. 19 (1839).
   C. vaginata, Endl. in Lehm. Pl. Preiss. ii. 23 (1846).
   C. petrophiloides, (F.v.M.) Benth. Fl. Austr. vi. 431 (1873).
   C. setosa, Lindl. Swan Riv. App. 44 t. 6 (1839).
   C. aurea, Lindl. l. c. 44.
   C. melanopogon, Endl. in Lehm. Pl. Preiss. ii. 18 (1846).
   C. setigera, R.Br. Prodr. 300 (1810).
   C. psyllium, Endl. in Lehm. Pl. Preiss. ii. 1 (1846).
   C. Dielsii, W. V. Fitzg. in Journ. Muell. Bot. Soc. W.A. i. n. 11 82 (1903).
   C. villosa, Benth. Fl. Austr. vi. 433 (1873).
   C. Drummondii, Benth. l. c. 433.
   C. breviscapa, R.Br. Prodr. 301 (1810).

7. *ANIGOZANTHOS*, Labill. Voy. i. 409, t. 22 (1798).
   A. rufa, Labill. Voy. i. 411. t. 22 (1798).
   A. pulcherrima, Hook. Bot. Mag. t. 4180 (1845).
   A. flavida, Redoute et D.C. Lil. t. 176 (1807).
   A. Preissii, Endl. in Lehm. Pl. Preiss. ii. 26 (1846).
   A. humilis, Lindl. Swan Riv. App. 46. t. 6b (1839). (*A. Dorrienii*, Domin.)
   A. viridis, Endl. in Lehm. Pl. Preiss. ii. 25 (1847).
   A. Manglesii, D. Don in Sweet Brit. Fl. Gard. ser. ii. t. 265 (1836).
   A. bicolor, Endl. in Lehm. Pl. Preiss. ii. 26 (1847). (*A. Gabrielae*, Domin.)

Taccaceae.

1. *TACCA*, Forst Char. Gen. 65 (1776).
   T. pinnatifida, R. et G. Forst, Char. Gen. 65 (1776).

Dioscoreaceae.

1. *DIOSCOREA*, (Plum.) Linn. Gen. ed. i. 306 (1737).
   D. hastifolia, Endl. in Lehm. Pl. Preiss. ii. 33 (1846).

Iridaceae.

ROMULEA, Maratti, Diss. Romul. et Saturn. Romae. 13. t. 1 (1772).
**R. rosea*, (Linn.) Eckl. (Afr. austr.)
**R. parviflora*, (Salisb.) J. Britten. (Europ. occ.)
HOMERIA, Vent. Dec. Gen. Nov. 5 (1808).
**H. collina*, (Thunb.) Vent. (Afr. austr.).
**H. miniata*, Sweet. (Afr. austr.)

1. *PATERSONIA*, R.Br. in Bot. Mag. t. 1041 (1807).
   P. occidentalis, R.Br. Prodr. 304 (1810).
   P. umbrosa, Endl. in Lehm. Pl. Preiss. ii. 31 (1846).
   P. xanthina, F.v.M. Fragm. i. 214 (1859).
   P. limbata, Endl. in Lehm. Pl. Preiss. ii. 29 (1846).
   P. juncea, Lindl. Swan River App. 58 (1839).
   P. Maxwelli, (F.v.M.) Benth. Fl. Austr. vi. 405 (1873).
   P. pygmaea, Lindl. Swan Riv. App. 58 (1839).
   P. lanata, R.Br. Prodr. 303 (1810).
   P. rudis, Endl. in Lehm. Pl. Preiss. ii. 29 (1846).
   P. macrantha, Benth. Fl. Austr. vi. 407 (1873).
   P. Drummondii, (F.v.M.) Benth. l. c. 407.
   P. inaequalis, Benth. l. c. 408.
   P. graminea, Benth. l. c. 408.
   P. babianoides, Benth. l. c. 408.
2. *ORTHROSANTHUS*, Sweet, Fl. Austral. t. 11 (1827).
   O. multiflorus, Sweet, Fl. Austr. t. 11 (1827).
   O. Muelleri, Benth. Fl. Austr. vi. 411 (1873).
   O. laxus, (Endl.) Benth. l. c. 411.
   O. gramineus, (Endl.) Benth. l. c. 411.
   O. polystachyus, Benth. l. c. 411.

MICROSPERMAE.

Burmanniaceae.

1. *BURMANNIA*, Linn. Syst. Nat. 8 (1737).
   B. disticha, Linn. Sp. Pl. 287 (1753).

Orchidaceae.

II. Monandrae-Acrotonae.

a.—Acranthae-Convolutae.

Thelymitreae.

1. *THELYMITRA*, Forst. Char. Gen. 97 (1776).
   T. ixioides, Swartz, in K. Acad. Stockh. Handl. 228, t. 3 (1800).
   T. canaliculata, R.Br. Prodr. 314 (1810).
   T. crinita, Lindl. Swan Riv. App. 49 (1839).
   T. fasciculata, Fitzg. Austr. Orc. ii. t. 29 (1888).
   T. aristata, Lindl. Gen. et. sp. Orch. 521 (1840).
   T. longifolia, Forst. Char. Gen. 98, t. 49 (1776).
   T. pauciflora, R.Br. Prodr. 314 (1810).
   T. mucida, Fitz. in Gard. Chron. ii. 497 (1882).
   T. villosa, Lindl. Swan Riv. App. 49, t. 8c (1839).
   T. tigrina, R.Br. Prodr. 315 (1810).
   T. stellata, Lindl. Swan Riv. App. 49 (1839).
   T. fusco-lutea, R.Br. Prodr. 315 (1810).
   T. flexuosa, Endl. Nov. Stirp. Dec. 23 (1839).
   T. antennifera, (Lindl.) Hook, f. Fl. Tasm. ii. 4, t. 101a (1860).
   T. psammophila, C. Andrews, in Journ. W.A. Nat. Hist. Soc. ii. 57 (1905).
   T. carnea, R.Br. Prodr. 314 (1810).
   T. Macmillani, F.v.M. Fragm. v. 93 (1865).
   T. variegata, (Lindl.) Benth. Fl. Austr. vi. 323 (1873).

2. *EPIBLEMA*, R.Br. Prodr. Fl. Nov. Holl. 315 (1810).
E. grandiflorum R.Br. Prodr. 315 (1810).

Diurideae.

3. *DIURIS*, Sm. in Trans. Linn. Soc. iv. 122 (1798).
D. laevis Fitzg. in Gard. Chron. xvii. pt. i. 495 (1882).
D. Purdei, Diels, in Journ. Muell. Bot. Soc. W.A. ii. 79 (1903).
D. setacea, R.Br. Prodr. 316 (1810).
D. emarginata, R.Br. l. c. 316.
D. longifolia, R.Br. l. c. 316.
D. pauciflora, R.Br. l. c. 316.
D. carinata, Lindl. Gen et Sp. Orch. 510 (1840).

4. *MICROTIS*, R.Br. Prodr. Fl. Nov. Holl. 320 (1810).
M. porrifolia, R.Br. Prodr. 320 (1810).
M. truncata, Rogers, in Trans. Roy. Soc. S. Austr. xliv. 326 (1920).
M. parviflora, R.Br. Prodr. 321 (1810).
M. media, R.Br. l. c. 321.
M. alba, R.Br. l. c. 321.
M. orbicularis, Rogers, in Trans. Roy. Soc. S. Austr. xxxi. 63 (1907).
M. atrata, Lindl. Swan Riv. App. 54 (1839).
M. pulchella, R.Br. Prodr. 321 (1810).
M. gymnadenoides, Diels, in Journ. Muell. Bot. Soc. ii. 79 (1903).

5. *GOADBYELLA*, Rogers, in Trans. Roy. Soc. South Australia, li. 294 (1927).
G. gracilis, Rogers, in Trans. Roy. Soc. S.A. li. 294 (1927).

6. *PRASOPHYLLUM*, R.Br. Prodr. Fl. Nov. Holl. 317 (1810).
P. australe R.Br. Prodr. 318 (1810).
P. elatum, R.Br. l. c. 318.
P. Muelleri, C. Andrews, in Journ. Muell. Bot. Soc. W.A. Ser. I. ix. 19 (1903).
P. regium, Rogers, in Trans. Roy. Soc. S. Austr. xlii. 27 (1918).
P. lanceolatum, Rogers, in l. c. xliv. 325 (1920).
P. ellipticum, Rogers, in l. c. 325.
P. fimbria, Reichb. fil. Beitr. 60 (1871).
P. hians, Reichb. f. l. c. 59.
P. cyphochilum, Benth. Fl. Austr. vi. 340 (1873).
P. ovale, Lindl. Swan Riv. App. 54 (1839).
P. macrostachyum, R.Br. Prodr. 318 (1810).
P. attenuatum, R. Fitzg. in Gard. Chron. xvii. i. 495 (1882).
P. plumaeforme, R. Fitzg. l. c. 495.
P. triangulare, R. Fitzg. l. c. 495.
P. parvifolium, Lindl. Swan Riv. App. 54 (1839).
P. gibbosum, R.Br. Prodr. 318 (1810).
P. cucullatum, Reichb. fil. Beitr. 59 (1871).

Pterostylideae.

7. *CALEANA*, R.Br. Prodr. Fl. Nov. Holl. 329 (1810).
C. nigrita, Lindl. Swan Riv. App. 54 (1839).

8. *SPICULAEA*, Lindl. Swan Riv. Append. 56 (1839).
S. ciliata, Lindl. Swan Riv. App. 56 (1839).

9. *DRAKAEA*, Lindl. Bot. Reg. xxv. App. 55 (1834).
D. elastica, Lindl. Swan Riv. App. 55 (1839).
D. Fitzgeraldii, Schltr. in Fedde, Repert. Spec. Nov. xvii. 81 (1921).
D. glyptodon, Fitzg. in Gard. Chron. i. 494 (1882).
D. Jeanensis, Rogers, in Trans. Roy. Soc. S.A. xliv. 322. t. 13 (1920).

10. *PTEROSTYLIS*. R.Br. Prodr. Fl. Nov. Holl. 326 (1810).
P. nana, R.Br. Prodr. 327 (1810).
P. pyramidalis, Lindl. Swan Riv. App. 53 (1839).
P. reflexa, R.Br. Prodr. 327 (1810).
P. robusta, Rogers, in Trans. Roy. Soc. S. Austr. ii. 296 (1927).
P. constricta, O. H. Sargent, in Journ. W.A. Nat. Hist. Soc. iv. 24 (1907).
P. recurva, Benth. Fl. Austr. vi. 360 (1873).
P. turfosa, Endl. in Lehm. Pl. Preiss. ii. 5 (1846).
P. rufa, R.Br. Prodr. 327 (1810).
P. Sargenti, C. Andrews, in Journ. W.A. Nat. Hist. Soc. ii. 57 (1905).
P. vittata, Lindl. Swan Riv. App. 53 (1839).

Caladeniae.

11. *ACIANTHUS*, R.Br. Prodr. Fl. Nov. Holl. 321 (1810).
A. exsertus, R.Br. Prodr. 321 (1810)—A species stated to occur in Western Australia, *but no authentic record seen by me.*

12. *CYRTOSTYLIS*, R.Br. Prodr. Fl. Nov. Holl. 322 (1810).
C. reniformis, R.Br. Prodr. 322 (1810).

13. *CALOCHILUS*, R.Br. Prodr. Fl. Nov. Holl. 320 (1810).
C. Robertsoni, Benth. Fl Austr. vi. 315 (1873).

14. *ERIOCHILUS*, R.Br. Prodr. Fl. Nov. Holl. 323 (1810).
E. scaber Lindl. Swan Riv. App. 53 (1839).
E. tenuis, Lindl. l. c. 53.
E. dilatatus, Lindl. l. c. 53.
E. multiflorus Lindl. l. c. 53.

15. *LYPERANTHUS*, R.Br. Prodr. Fl. Nov. Holl. 325 (1810).
L. nigricans R.Br. Prodr. 325 (1810).
L. serratus, Lindl. Gen. et Sp. Orch. 393 (1840).
L. Forrestii, F.v.M. in Wing's S. Sc. Rec. ii. 55 (1882).

16. *LEPTOCERAS*, Lindl. Swan Riv. App. 58 (1839).
L. fimbriata, Lindl. Swan Riv. App. 53 (1839).

17. *CALADENIA*, R.Br. Prodr, Fl. Nov. Holl. 323 (1810).
C. Menziesii, R.Br. Prodr. 325 (1810).
C. Bryceana, Rogers, in Trans. Roy. Soc. S. Austr. xxxviii. 359. t. 18 (1914).
C. discoidea, Lindl. Swan Riv. App. 52 (1839).
C. Cairnsiana, F.v.M. Fragm. vii. 31 (1869).
C. multiclavia, Reichb. fil. Beitr. 64 (1871).
C. reticulata, R. Fitzg. Austr. Orch. II. ix. 2 (1883).
C. filamentosa, R.Br. Prodr. 324 (1810).
C. Dorrienii, Domin, in Journ. Linn. Soc. xli. 251 (1913).
C. tentaculata, Tate, in Trans. Roy. Soc. S. Austr. xii. 130 (1889).
C. Patersoni, R.Br. Prodr. Fl. Nov. Holl. 324 (1810) v. Longicauda, (Lindl.) Rogers.
C. pectinata, Rogers, in Trans. Roy. Soc. S. Austr. xliv. 352 (1920).
C. lobata, R. Fitzg. in Gard. Chron. xvii. i. 461 (1882).
C. dilatata, R.Br. Prodr. 325 (1810).
C. radialis, Rogers, in Trans. Roy. Soc. S. Austr. li. 296 (1927).
C. clavigera, A. Cunn. ex Lindl. Gen et Sp. Orch. 422 (1840).
C. plicata, R. Fitzg. in Gard. Chron. vii. i. 461 (1882).
C. cristata, Rogers, in Trans. Roy. Soc. S. Austr. xlvii. 337 (1923).
C. macrostylis, Fitzg. in Gard. Chron. xvii. i. 462 (1882).
C. Drummondii, Benth. Fl. Austr. vi. 383 (1873).
C. triangularis, Rogers, in Trans. Roy. Soc. S. Austr. li. 10 (1927).
C. hirta, Lindl. Swan Riv. App. 52 (1839).
C. lavandulacea, Rogers, in Trans. Roy. Soc. S. Austr. li. 11 (1927).
C. Roei, Benth. Fl. Austr. vi. 383 (1873).
C. Doutchae, O. H. Sargent, in Journ. Bot. lix. 175 (1921).
C. Barbarossae, Reichb. fil. Beitr. 64 (1871).
C. flava, R.Br. Prodr. 324 (1810).
C. paniculata, R. Fitzg. in Gard. Chron. xvii. I. 461 (1882).
C. Purdieana, C. Andrews, in Journ. Proc. Muell. Bot. Soc. i. 39 (1902).
C. unita, R. Fitzg. in Gard. Chron. xvii. i. 461 (1882).
C. latifolia, R.Br. Prodr. 324 (1810).
C. reptans, Lindl. Swan Riv. App. 52 (1839).
C. nana, Endl. in Lehm. Pl. Preiss. ii. 7 (1846).
C. tenuis, R. Fitzg. in Gard. Chron. xvii. i. 462 (1882).
C. carnea, R.Br. Prodr. 324 (1810).
C. aphylla, Benth. Fl. Austr. vi. 387 (1873).
C. saccharata, Reichb. fil. Beitr. 63 (1871).
C. deformis, R.Br. Prodr. 324 (1810).
C. sericea, Lindl. Swan Riv. App. 52 (1839).
C. gemmata, Lindl. l. c. 52. (*C. Gertrudae*, Ostf.)
C. ixioides, Lindl. l. c. 52.

18. *GLOSSODIA*, R.Br. Prodr. Fl. Nov. Holl. 325 (1810).
G. Brunonis, Endl. Nov. Stirp. Dec. 16 (1839).
G. intermedia, R. Fitzg. in Gard. Chron. xvii. I. 462 (1882).
G. emerginata, Lindl. Gen et Sp. Orch. 424 (1840).

Pogonieae.

19. *CORYSANTHES*, R.Br. Prodr. Fl. Nov. Holl. 328 (1810).
C. fimbriata, R.Br. Prodr. 328 (1810).

20. *CRYPTOSTYLIS*, R.Br. Prodr. Fl. Nov. Holl. 317 (1810).
C. ovata, R.Br. Prodr. 317 (1810).

Gastrodinae.

21. *GASTRODIA*, R.Br. Prodr. Fl. Nov. Holl. 330 (1810).
G. sesamoides, R.Br. Prodr. 330 (1810).

Rhizanthellinae.

22. *RHIZANTHELLA*, Rogers, in Journ. Roy. Soc. W. Austr. xiv. l. (1929).
R. Gardneri, Rogers, in Journ. Roy. Soc. W. Austr. xiv. l. (1929).

Pleuranthae.

Convolutae.

Crytopodiinae.

23. *EULOPHIA*, R.Br. (ex. Lindl.) in Bot. Reg. t. 686 (1823).
E. venosa, (F.v.M.) Benth. Fl. Austr. vi. 300 (1873).

II.—DUPLICATE.—Sympodiales.

Dendrobiinae.

24. *DENDROBIUM*, Swartz, in Nov. Act. Upsal. vi. 82 (1799).
D. dicuphum, F.v.M. Fragm. viii. 28 (1871).

Cymbidiinae.

25. *CYMBIDIUM*, Swartz, in Nov. Act. Upsal. vi. 70 (1799).
C. canaliculatum, R.Br. Prodr. 331 (1810).

DICOTYLEDONEAE.

ARCHICHLAMYDEAE.

Casuarinaceae.

1. *CASUARINA*, (Rumph.) Linn. Amoen. Acad. iv. 143 (1759).
C. Stowardi, S. Moore, in Journ. Linn. Soc. Bot. xlv. 193 (1920).
C. acutivalvis, F.v.M. Fragm. x. 61 (1876).
C. glauca, Sieber, in Spreng. Syst. Veg. iii. 803 (1826).
C. Prinsepiana, C. Andrews, in Journ. W. Austr. Nat. Hist. Soc. i. 43 (1904).
C. lepidophloia, F.v.M. Fragm. x. 115 (1877).
C. Huegeliana, Miq. in Lehm. Pl. Preiss. i. 640 (1846). (*C. Dorrienii.* Domin.)
C. campestris, Diels, in Engler's Botan. Jahrb. xxxv. 126 (1904).
C. Fraseriana, Miq. Rev. Crit. Cas. 59, t. 6d (1848).
C. Baxteriana, Miq. Rev. Cas. 37. t. 3c (1848).
C. bicuspidata, Benth. Fl. Austr. vi. 202 (1873).
C. trichodon, Miq. in Lehm. Pl. Preiss. i. 639 (1845).
C. corniculata, F.v.M. Fragm. x. 62 (1876). (*C. horrida*, Herbert; *C. spinosissima*, Gardn.)
C. decussata, Benth. Fl. Austr. vi. 200 (1873).
C. Decaisneana, F.v.M. Fragm. i. 61 (1858).
C. Helmsii, Ewart et Gordon, in Proc. Roy. Soc. Vict. n. s. xxxii, 192 (1920).
C. humilis, Otto et Dietr. Allg. Garteuz, ix. 163 (1841). (*C. leptotrema*, S. Moore.)
C. Drummondiana, Miq. Rev. Crit. Casuar, xxvi. t. 1d (1848).
C. microstachya, Miq. in Lehm. Pl. Preiss. i. 642 (1845).
C. thuyoides, Miq. in Lehm. Pl. Preiss. i. 641 (1845).
C. acuaria, F.v.M., in Journ. Bot. v. 212 (1868).
C. fibrosa, Gardner, in Journ. Roy. Soc. W.A. xiii. 61 (1928).
C. grevilleoides, Diels, in Engler's Botan. Jahrb. xxxv. 130 (1904).

URTICALES.

Ulmaceae.

1. *CELTIS*, (Tourn.) Linn. Gen. ed. I. 337 (1737).
C. philippinensis, Blanco, Fl. Philip. ed. i. 197 (1837).
2. *TREMA*, Lour. Fl. Cochinchin. 562 (1790).
T. aspera, Blume, Mus. Bot. Ludg. Batav. ii. 58 (1851).

Moraceae.

1. *FICUS*, (Tourn.) Linn. Syst. ed. I. (1735).
F. nesophila, Miq. in Ann. Mus. Lugd. Bat. iii. 286 (1867).
F. eugenioides, F.v.M. Docum. Intern. Exhib. 26 (1866).
F. leucotricha, Miq. in Ann. Mus. Lugd. Bat. iii. 285 (1867).
F. puberula, A. Cunn. in Hook. Lond. Journ. vi. 562 (1847).
F. platypoda, A. Cunn. l. c. 561.
F. coronulata, F.v.M. in Journ. Bot. Neerland. 241 (1861).
F. scabra, Forst. f. Prodr. 76 (1786).
F. orbicularis, A. Cunn. in Hook. Lond. Journ. vii. 426 (1848).
F. aculeata, A. Cunn. l. c. 426.
F. scobina, Benth. Fl. Austr. vi. 176 (1873).
F. hispida, Linn. fil. Suppl. 442 (1781).
F. glomerata, Willd. Sp. Pl. iv. 1148 (1806).

Urticaceae.

URTICA, (Tourn.) Linn. Syst. ed. I. (1753).
**U. urens*, Linn. (Cosmop.)

1. *POUZOLSIA*, Gaud. in Freyc. Voy. Bot. 503 (1826).
P. indica, Gaud. in Freyc. Voy. Bot. 503 (1826).

2. *PARIETARIA*, (Tourn.) Linn. Syst. ed. I. (1735).
P. debilis, Forst. fil. Prodr. 73 (1786).

PROTEALES.

Proteaceae.

I.—Persoonioideae.

1. *PERSOONIA*, Smith, in Trans. Linn. Soc. iv. 215 (1798).
P. hakeiformis, Meissn. in Hook. Kew Journ. iv. 185 (1852).
P. teretifolia, R.Br. in Trans. Linn. Soc. x. 160 (1810).
P. saccata, R.Br. Prodr. Suppl. 12 (1830).
P. Saundersiana, Kipp. in Hook. Kew Journ. vii. 72 (1855).
P. diadena, F.v.M. Fragm. x. 46 (1876).
P. comata, Meissn. in Hook. Kew Journ. vii. 71 (1855).
P. brachystylis, F.v.M. Fragm. vi. 221 (1868).
P. falcata, R.Br. in Trans. Linn. Soc. x. 162 (1810).
P. trinervis, Meissn. in Hook. Kew Journ. iv. 185 (1852).
P. tortifolia, Meissn. l. c. 185.
P. angustiflora, Benth, Fl. Austr. v. 386 (1870).
P. rudis, Meissn. in Hook. Kew Journ. iv. 185 (1852).
P. microcarpa, R.Br. in Trans. Linn. Soc. x. 160 (1810).
P. sulcata, Meissn. in Hook. Kew Journ. iv. 185 (1852).
P. acicularis, F.v.M. Fragm. vi. 220 (1868).
P. scabrella, Meissn. in Hook. Kew Journ. vii. 72 (1855).
P. dillwynioides, Meissn. l. c. iv. 185 (1852).
P. striata, R.Br. Prodr. Suppl. 13 (1830).
P. quinquenervis, Hook. Ic. Pl. t. 425 (1842).
P. rufiflora, Meissn, in Hook. Kew Journ. vii. 72 (1855).
P. scabra, R.Br. in Trans. Linn. Soc. x. 162 (1810).
P. graminea, R.Br. l. c. 164.
P. longifolia, R.Br. l. c. 164.
P. articulata, R.Br. l. c. 164.
P. elliptica, R.Br. l. c. 164.
P. leucopogon, S Moore, in Journ. Linn. Soc. xxxiv. 220 (1898).

2. *FRANKLANDIA*, R.Br. in Trans. Linn. Soc. x. 157 (1810).
F. fucifolia, R.Br. in Trans. Linn. Soc. x. 157 (1810).
F. triaristata, Benth Fl. Austr. v. 377 (1870).

3. *ISOPOGON*, R.Br. ex Knight, Prot. 93 (1809).
I. latifolius, R.Br. Prodr. Suppl. 8 (1830).
I. cuneatus, R.Br. in Trans. Linn. Soc. x 73 (1810).
I. linearis, Meissn. in Hook. Kew Journ. vii. 69 (1855).
I. polycephalus, R.Br. in Trans. Linn. Soc. x 73 (1810).
I. attenuatus, R.Br. l. c. 73.
I. sphaerocephalus, Lindl. Swan Riv. App. 34 (1839).
I. uncinatus, R Br. Prodr. Suppl. 8 (1830).

I. buxifolius, R.Br. in Trans. Linn. Soc. x. 73 (1810).
I. axillaris, R.Br. l.c. 74.
I tridens, F.v.M. Fragm. vi. 239 (1868).
I. Baxteri, R.Br. Prodr. Suppl. 9 (1830).
I. roseus, Lindl. Bot. Reg. 37 (1842).
I. adenanthoides, Meissn. in Hook. Kew Journ. vii. 69 (1855).
I. trilobus, R.Br. in Trans. Linn. Soc. x. 72 (1810).
I. tripartitus, R.Br. Prodr. Suppl. 8 (1830).
I. longifolius, R.Br. in Trans. Linn. Soc. x. 73 (1810).
I. Drummondii, Benth. Fl. Austr. v. 344 (1870).
I. heterophyllus, Meissn. in Lehm. Pl. Preiss. i. 504 (1844).
I. villosus, Meissn. in Hook. Kew Journ. iv. 183 (1852).
I. alcicornis, Diels, in Engler's Botan. Jahrb. xxxv. 134 (1904).
I. teretifolius, R.Br. in Trans. Linn. Soc. x. 71 (1810).
I. asper, R.Br. Prodr. Suppl. 8 (1830).
I. crithmifolius, F.v.M. Fragm. vi. 239 (1868).
I. formosus, R.Br. in Trans. Linn. Soc. x. 72 (1810). (*I. occidentalis*, Herbert.)
I. divergens, R.Br. Prodr. Suppl. 7 (1830).
I. scabriusculus, Meissn. in Hook. Kew Journ. iv. 182 (1852).

4. *PETROPHILA*, R.Br. in Trans. Linn. Soc. x. 67 (1810).
P. teretifolia, R.Br. in Trans. Linn. Soc. x 68 (1810).
P. longifolia, R.Br. Prodr. Suppl. 5 (1830).
P. media R.Br. l. c. 5.
P. acicularis R.Br. in Trans. Linn. Soc. x. 69 (1810).
P. megalostegia F.v.M. Fragm. x 61 (1876).
P. linearis R.Br. Prodr. Suppl. 6 (1830).
P. anceps, R.Br. Prodr. Suppl. 5 (1830).
P. heterophylla, Lindl. Swan Riv. App. 35 (1839).
P. biloba, R.Br. Prodr. Suppl. 7. (1830).
P. propinqua, R.Br. l. c. 7.
P. squamata, R.Br. in Trans. Linn. Soc. x 70 (1810).
P. colorata, Meissn. in Lehm. Pl. Preiss. ii. 246 (1847).
P. striata, R.Br. Prodr. Suppl. 6 (1830).
P. divaricata, R.Br. l. c. 7.
P. serruriae, R.Br. l. c. 6.
P. inconspicua, Meissn. in Hook. Kew Journ. vii. 68 (1855).
P. trifida, R.Br. in Trans. Linn. Soc. x 70 (1810).
P. carduacea, Meissn. in Hook. Kew Journ. iv. 182 (1852).
P. Shuttleworthiana, Meissn. in Lehm. Pl. Preiss. ii. 246 (1847).
P. macrostachya, R.Br. Prodr. Suppl. 7 (1830).
P. diversifolia, R.Br. in Trans Linn. Soc. x 70 (1810).
P. biternata, Meissn. in Hook. Kew Journ. vii. 69 (1855).
P. plumosa, Meissn. l. c. 69.
P. glabriflora, Domin. New Add. Flora W.A. 3 (1923).
P. ericifolia, R.Br. Prodr. Suppl. 5 (1830).
P. scabriuscula, Meissn. in Lehm. Pl. Preiss. i. 495 (1844).
P. chrysantha, Meissn. in Hook. Kew Journ. vii. 68 (1855).
P. fastigiata, R.Br. in Trans. Linn. Soc. x. 76 (1810).
P. seminuda, Lindl. Swan Riv. App. 34 (1839).
P. circinata, Kippist, ex. Meissn. in Hook. Kew Journ. vii. 67 (1855).
P. Drummondii, Meissn. in Lehm. Pl. Preiss. i. 496 (1844).
P. crispata, R.Br. Prodr. Suppl. 6 (1830).
P. rigida, R.Br. in Trans. Linn. Soc. x 69 (1810).
P. conifera, Meissn. in Hook. Kew Journ. vii. 67 (1855).
P. semifurcata, (F.v.M.) Benth. Fl. Austr. v. 335 (1870).
P. incurvata, W. V. Fitzg. in Journ. Bot. l. 22 (1912).

5. *ADENANTHOS*, Labill. Nov. Holl. Pl. sp. i. 28. t. 36 (1804).
A. Detmoldi, F.v.M. Fragm. viii. 149 (1874).
A. barbigera, Lindl. Swan Riv. App. 36 n. 182 (1839). (*A. intermedius*, Ostf.)
A. obovata, Labill. Nov. Holl. Pl. Sp. i. 29. t. 37 (1804).
A. cuneata, Labill. l. c. 28. t. 36.
A. Cunninghamii, Meissn. in Lehm. Pl. Preiss. i. 513 (1845).
A. pungens, Meissn. l. c. 515.

A. venosa, Meissn. in Hook. Kew Journ. iv. 183 (1852).
A. Dobsoni, F.v.M. Fragm. vi. 204 (1868).
A. Forrestii, F.v.M. in Wing's South. Sci. Rec. ii. 230 (1882).
A. linearis, Meissn. in Hook. Kew Journ. iv. 183 (1852).
A. sericea, Labill. Nov. Holl. Pl. Sp. i. 29. t. 33 (1804).
A. cygnorum, Diels, in Engler's Botan. Jahrb. xxxv. 138 (1904).
A. Meissneri, Lehm. in Lehm. Pl. Preiss. i. 512 (1844).
A. filifolia, Benth. Fl. Austr. v. 355 (1810).
A. flavidiflora, F.v.M. Fragm. i. 157 (1859).
A. argyrea, Diels, in Engler's Botan. Jahrb. xxxv. 138 (1904). (*A. intricata*, Gardner).
A. Drummondii, Meissn. in Lehm. Pl. Preiss. i. 514 (1845).
A. apiculata, R.Br. Prodr. Suppl. 9 (1830).

6. *STIRLINGIA*, Endl. Gen. 339 (1838). (*Simsia*, R.Br. 1810.)
S. simplex, Lindl. Swan Riv. App. 30 (1839).
S. abrotonoides, Meissn. in Lehm. Pl. Preiss. i. 517 (1845).
S. teretifolia, Meissn. in l. c. 515.
S. tenuifolia, (R.Br.) Steud. Nom. ed. II. ii. 644 (1821).
S. latifolia, (R.Br.) Steud. l. c. 644.

7. *SYNAPHAEA*, R.Br. in Trans. Linn. Soc. x. 155 (1810).
S. polymorpha, R.Br. in Trans. Linn. Soc. x. 156 (1810).
S. reticulata, (Sm.) Gardner, n. comb. (*S. dilatata*, R.Br.)
S. favosa, R.Br. in Trans. Linn. Soc. x 156 (1810).
S. Preissii, Meissn. in Lehm. Pl. Preiss. i. 529 (1845).
S. acutiloba, Meissn. in l. c. 528.
S. petiolaris, R.Br. in Trans. Linn. Soc. x. 156 (1810).
S. decorticans, Lindl. Swan Riv. App. 32 (1839).
S. pinnata, Lindl. l. c. 32.

8. *CONOSPERMUM*, Smith, in Trans. Linn. Soc. iv. 213 (1798).
C. capitatum, R.Br. in Trans. Linn. Soc. x. 155 (1810).
C. petiolare, R.Br. Prodr. Suppl. 11 (1830).
C. teretifolium, R.Br. in Trans. Linn. Soc. x. 155 (1810).
C. flexuosum, R.Br. Prodr. Suppl. 11 (1830).
C. acerosum, Lindl. Swan Riv. App. 30 (1839).
C. amoenum, Meissn. in Lehm. Pl. Preiss. i. 522 (1845). (*C. Dorrienii*, Domin.)
C. Croniniae, Diels, in Engler's Botan. Jahrb. xxxv 143 (1904).
C. nervosum, Meissn. in Hook. Kew Journ. vii. 71 (1855).
C. diffusum, Benth. Fl. Austr. v. 367 (1870).
C. glumaceum, Lindl. Swan Riv. App. 30 (1839).
C. ephedroides, (Kipp) Meissn. in Hook. Kew Journ. vii. 70 (1855).
C. Todii, F.v.M. Fragm. x. 20 (1876).
C. polycephalum, Meissn. in Lehm. Pl. Preiss. ii. 249 (1847).
C. leianthum, E. Pritzel, in Engler's Jahrb. xxxv. 141 (1904).
C. Etoniae, E. Pritzel, in l. c. 141
C. caeruleum, R.Br. in Trans. Linn. Soc. x. 154 (1810).
C. debile, (Kipp.) Meissn. in Hook. Kew Journ. vii. 70 (1855).
C. scaposum, Benth. Fl. Austr. v. 369 (1870).
C. Huegelii, R.Br. in Endl. Nov. Stirp. Dec. 58 (1839).
C. densiflorum, Lindl. Swan Riv. App. 32 (1839).
C. Brownii, Meissn. in Lehm. Pl. Preiss. ii. 248 (1847).
C. distichum, R.Br. in Trans. Linn. Soc. x. 155 (1810).
C. floribundum, Benth. Fl. Austr. v. 373 (1870).
C. incurvum, Lindl. Swan Riv. App. 30 (1839).
C. brachyphyllum, Lindl. l. c. 31.
C. stoechadis, Endl. in Ann. Wien. Mus. ii. 208 (1838).
C. triplinervium, R.Br. Prodr. Suppl. 11 (1830).
C. bracteosum, Meissn. in Lehm. Pl. Preiss. i. 518 (1845).
C. crassinervium, Meissn. in Hook. Kew Journ. iv. 184 (1852).

II.—Grevilloideae.

9. *GREVILLEA*, R.Br. in Trans. Linn. Soc. x. 167 (1810).
G. pinaster, Meissn. in Hook. Kew Journ. vii. 76 (1855).
G. obtusifolia, Meissn. in Hook. Kew Journ. iv. 187 (1852).

G. sparsiflora, F.v.M. Fragm. vi. 206 (1868).
G. macrostylis, F.v.M. l. c. i. 137 (1859).
G. tripartita, Meissn. in Hook. Kew Journ. iv. 186 (1852).
G. platypoda, F.v.M. Fragm. vi. 205 (1868).
G. patentiloba, F.v.M. l. c. i. 137 (1859).
G. pectinata, R.Br. Prodr. Suppl. 23 (1830).
G. plurijuga, F.v.M. Fragm. iv. 84 (1864).
G. oncogyne, Diels, in Engler's Botan. Jahrb. xxxv. 149 (1904).
G. nudiflora, Meissn. in Hook. Kew Journ. iv. 186 (1852).
G. stenomera, F.v.M. Fragm. iv. 85 (1864).
G. Thelemanniana, Hueg. in Endl. Nov. Stirp. Dec. i. 6 (1839).

Hebegyne, Benth.

G. concinna, R.Br. in Trans. Linn. Soc. x. 172 (1810).
G. Pritzelii, Diels, in Engler's Botan. Jahrb. xxxv. 150 (1904).
G. apiciloba, F.v.M. Fragm. x. 45 (1876).
G. Hookeriana, Meissn. in Lehm. Pl. Preiss. i. 546 (1845).
G. Baxteri, R.Br. Prodr. Suppl. 22 (1830).
G. eriobotrya, F.v.M. Fragm. x. 44 (1876).
G. pterosperma, F.v.M. in Trans. Phil. Soc. Viet. i. 22 (1854).
G. stenobotrya, F.v.M. Fragm. ix. 3 (1875).
G. eriostachya, Lindl. Swan Riv. App. 36 (1839).
G. excelsior, Diels, in Engler's Botan. Jahrb. xxxv. 151 (1904).
G. thyrsoides, Meissn. in Hook. Kew Journ. vii. 77 (1855).
G. chrysodendron, R.Br. in Trans. Linn. Soc. x. 176 (1810).
G. cirsiifolia, Meissn. in Lehm. Pl. Preiss. 253 (1847).
G. bipinnatifida, R.Br. Prodr. Suppl. 23 (1810).
G. armigera, Meissn. in Hook. Kew Journ. iv. 186 (1852).
G. asparagoides, Meissn. l. c. 186.

Plagiopoda, Benth.

G. Treueriana, F.v.M. Fragm. ix. 123 (1875).
G. juncifolia, Hook. in Mitch. Trop. Austr. 341 (1848).
G. Wilsoni, A. Cunn in Wils. Voy. round the World, 273 (1835).
G. erectiloba, F.v.M. Fragm. x. 44 (1876).
G. asteriscosa, Diels, in Engler's Jahrb. xxxv. 151 (1904).
G. insignis, Kippist, ex Meissn. in Hook. Kew Journ. vii. 76 (1855).
G. Brownii, Meissn. in Lehm. Pl. Preiss. i. 537 (1845).
G. crassifolia, Domin, New Add. Fl. W. Austr. 10 (1923).
G. fasciculata, R.Br. Prodr. Suppl. 20 (1830).
G. aspera, R.Br. in Trans. Linn. Soc. x. 172 (1810).
G. brachystylis, Meissn. in Lehm. Pl. Preiss. i. 538 (1845).
G. saccata, Benth. Fl. Austr. v. 450 (1870).
G. Drummondii, Meissn. in Lehm. Pl. Preiss. i. 536 (1845). (*G. pinelioides* W. V. Fitzg.)
G. deflexa F.v.M. in Melb. Chem. p. 72 (1883).
G. disjuncta, F.v.M. Fragm. vi. 206 (1868).
G. Yorkrakinensis, Gardner, in Journ. Roy. Soc. W.A. ix. pt. i. 34 (1923).
G. haplantha, (F.v.M.) Benth. Fl. Austr. v. 451 (1870).
G. extorris, S. Moore, in Journ. Linn. Soc. xxxiv. 221 (1898).
G. pinifolia, Meissn. in Hook. Kew Journ. iv. 186 (1852).
G. acuaria, (F.v.M.) Benth. Fl. Austr. v. 452 (1870).
G. Jamesoniana, W. V. Fitzg. in Proc. Linn. Soc. N.S.W. xxvii. 243 (1904).
G. aculeolata, S. Moore in Journ. Linn. Soc. xxxiv. 222 (1898).
G. pauciflora, R.Br. in Trans. Linn. Soc. x. 174 (1810).
G. cynanchicarpa, Meissn. in Hook. Kew Journ. vii. 75 (1855).

Calothyrsus, Benth.

G. quercifolia, R.Br. Prodr. Suppl. 23 (1830).
G. angulata, R.Br. l. c. 24.
G. Wickhami, Meissn. in Hook. Kew Journ. iv. 186 (1852).
G. agrifolia, A. Cunn. in R.Br. Prodr. Suppl. 24 (1830).
G. Victori, Morrison, in Journ. Bot. l. 276 (1912). (*G. miniata*, W. V. Fitzg.)
G. Cunninghamii, R.Br. Prodr. Suppl. 23 (1830).
G. Huegelii, Meissn. in Lehm. Pl. Preiss. i. 543 (1845).
G. Sarissa, S. Moore, in Journ. Linn. Soc. xxxiv. 222 (1898).
G. dimidiata, F.v.M. Fragm. iii. 146 (1863).

G. heliosperma, R.Br. in Trans. Linn. Soc. x. 176 (1810).
G. refracta, R.Br. l. c. 176.

Cycladenia, Benth.

G. annulifera, F.v.M. Fragm. iv. 85 (1864).
G. leucopteris, Meissn. in Hook. Kew Journ. vii. 76 (1855).

Cycloptera, Benth.

G. pyramidalis, A. Cunn. in R.Br. Prodr. Suppl. 25 (1830). (*G. leucadendron*, A. Cunn.)
G. simulans, A. Morrison, in Journ. Bot. l. 277 (1812).
G. Berryana, Ewart et J. White, in Proc. Roy. Soc. Viet. n. s. xxii. 14 (1909).
G. erythroclada W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 152 (1918).
G. viscidula, Gardner, in Bull. For. Dep. xxxii. 44 (1923).
G. striata, R.Br. in Trans. Linn. Soc. x. 177 (1810).
G. mimosoides, R.Br. in l. c. 177.
G. latifolia, Gardner, in Bull. For. Dep. xxxii. 43 (1923).

Eriostylis.

G. occidentalis, R.Br. in Trans. Linn. Soc. x. 173 (1810).
G. acerosa, F.v.M. Fragm. i. 136 (1859).
G. umbellulata, Meissn. in Lehm. Pl. Preiss. ii. 252 (1847).
G. pilulifera, (Lindl.) Gardner n. comb. (*G. oxystigma*, Meissn.)
G. uncinulata, Diels, in Engler's Botan. Jahrb. xxxv. 162 (1904). (*G. lycopodina*, S. Moore.)
G. Candolleana, Meissn. in Lehm. Pl. Preiss. i. 541 (1845).
G. scabra, Meissn. in l. c. 541.

Lissostylis.

G. commutata, F.v.M. Fragm. vi. 207 (1868).
G. stenophylla, W. V. Fitzg. in Journ. W.A. Nat. Hist. Soc. ii. 30 (1905).
G. pinnatisecta, (F.v.M.) Benth. Fl. Austr. v. 473 (1870).
G. argyrophylla, Meissn. in Hook. Kew Journ. vii. 75 (1855).
G. brachystachya, Meissn. in Lehm. Pl. Preiss. ii. 254 (1847).
G. Endlicheriana, Meissn. in l. c. i. 546 (1845).
G. Manglesioides, Messn. in. l. c. i. 547. (*G. Loboana, Domin.*)
G. diversifolia, Meissn. in l. c. i. 547.
G. filifolia, Meissn. in l. c. i. 547.
G. hakeoides, Meissn. in l. c. ii. 252 (1847).
G. inconspicua, Diels, in Engler's Botan. Jahrb. xxxv. 153 (1904).
G. teretifolia, Meissn. in Lehm. Pl. Preiss. ii. 255 (1847).
G. eryngioides, Benth. Fl. Austr. v. 476 (1870).
G. bracteosa, Meissn. in Lehm. Pl. Preiss. ii. 254 (1847).
G. crithmifolia, R.Br. Prodr. Suppl. 38 (1830).
G. trachytheca, F.v.M. Fragm. vi. 207 (1868).
G. brachyclada, W. V. Fitzg. in Journ. W.A. Nat. Hist. Soc. ii. 30 (1905).

Conogyne.

G. monticola, Meissn. in Lehm. Pl. Preiss. ii. 259 (1847).
G. Muelleri, Benth. Fl. Austr. v. 479 (1870).
G. trifida, (R.Br.) Meissn. in Lehm. Pl. Preiss. i. 553 (1845).
G. synapheae, R.Br. Prodr. Suppl. 23 (1830).
G. flexuosa, (Lindl.) Meissn. in Lehm. Pl. Preiss. i. 533 (1845).
G. leptobotrya, Meissn. in l. c. ii. 256 (1847).
G. brevicuspis, Meissn. in l. c. ii. 256.
G. intricata, Meissn. in Hook. Kew Journ. vii. 74 (1855).
G. didymobotrya, (Endl.) Meissn. in l. c. iv. 186 (1852).
G. polybotrya, Meissn. in l. c. iv. 185.
G. nematophylla, F.v.M. Fragm. i. 136 (1859).
G. Purdieana, Diels, in Engler's Botan. Jahrb. xxxv. 154 (1904).

Anadenia.

G. paradoxa, F.v.M. Fragm. vi. 246 (1868).
G. petrophiloides, Meissn. in Lehm. Pl. Preiss. ii. 257 (1847).
G. tenuiflora, (Lindl.) Meissn. in l. c. i. 554 (1845).
G. pulchella, (R.Br.) Meissn. in l. c. i. 553.
G. rudis, Meissn. in Hook. Kew Journ. vii. 73 (1855).
G. cordata, Gardner, in Journ. Roy. Soc. W.A. iv. pt. i. 35 (1923).
G. Shuttleworthiana, Meissn. in Lehm. Pl. Preiss. ii. 258 (1847).
G. integrifolia, (Endl.) Meissn. in D. C. Prodr. xiv. 385 (1856).

G. incrassata, Diels, in Engler's Botan. Jahrb. xxxv. 156 (1904).
G. ceratocarpa, Diels in l. c. 157.
G. stenocarpa, (F.v.M.) Benth. Fl. Austr. v. 485 (1870).

Manglesia.

G. acrobotrya, Meissn. in Hook. Kew Journ. vii. 74 (1855).
G. glabrata, (Lindl.) Meissn. in Lehm. Pl. Preiss. i. 549 (1845).
G. ornithopoda, Meissn. in l. c. ii. 256 (1847).
G. paniculata, Meissn. in l. c. i. 550 (1845).
G. biternata, Meissn. in l. c. i. 549.
G. triloba, Meissn. in Hook. Kew Journ. vii. 74 (1855).
G. amplexans, (F.v.M.) Benth. Fl. Austr. v. 488 (1870).
G. vestita, (Endl.) Meissn. in Lehm. Pl. Preiss. i. 548 (1845).
G. tridentifera, (Endl.) Meissn. in l. c. i. 549.
G. phanerophlebia, Diels, in Engler's Jahrb. xxxv. 157 (1904).
G. erinacea, Meissn. in Hook. Kew Journ. vii. 74 (1855).

10. *HAKEA*, Schrader, Sert. Hannov. 27. t. 17 (1797).

Grevilleoides.

H. chordophylla, F.v.M. in Hook. Kew Journ. ix. 23 (1857).
H. Cunninghamii, R.Br. Prodr. Suppl. 26 (1830).
H. suberea, S. Moore, in Journ. Linn. Soc. xxxiv. 223 (1898).
H. lorea, R.Br. Prodr. Suppl. 25 (1830).
H. macrocarpa, A. Cunn. ex. R.Br. Prodr. Suppl. 30 (1830).
H. arborescens, R.Br. in Trans. Linn. Soc. x. 187 (1810).
H. Morrisoniana, W. V. Fitzg. in Journ. Roy. Soc. W.A. iii. 134 (1918).
H. stenophylla, A. Cunn. ex R.Br. Prodr. Suppl. 30 (1830)

Euhakea.

H. cyclocarpa, Lindl. Swan Riv. App. 36 (1839).
H. crassifolia, Meissn. in Lehm. Pl. Preiss. i. 570 (1845).
H. Brooksiana, F.v.M. in Austr. Journ. Pharm. i. 430 (1886).
H. pandanicarpa, R.Br. Prodr. Suppl. 29 (1830).
H. Roei, Benth. Fl. Austr. v. 499 (1870).
H. adnata, R.Br. Prodr. Suppl. 26 (1830).
H. obliqua, R.Br. in Trans. Linn. Soc. x. 180 (1810).
H. polyanthema, Diels, in Engler's Botan. Jahrb. xxxv. 161 (1904).
H. Hookeriana, Meissn. in Hook. Kew Journ. iv. 208 (1852).
H. incrassata, R.Br. Prodr. Suppl. 29 (1830).
H. flabellifolia, Meissn. in Hook. Kew Journ. vii. 116 (1855).
H. Brownii, Meissn. in Lehm. Pl. Preiss. i. 569 (1845).
H. Baxteri, R.Br. Prodr. Suppl. 28 (1830).
H. ceratophylla, (Sm.) R.Br. in Trans. Linn. Soc. x. 184 (1810).
H. lasiantha, R.Br. Prodr. Suppl. 29 (1830).
H. eriantha, R.Br. l. c. 29
H. megalosperma, Meissn. in Hook. Kew Journ. vii. 177 (1855).
H. clavata, Labill. Nov. Holl. Pl. Sp. i. 31. t. 41 (1804).
H. orthorrhyncha, F.v.M. Fragm. v. 214 (1868).
H. Candolleana, Meissn. in Lehm. Pl. Preiss. ii. 262 (1847).
H. trifurcata, (Sm.) R.Br. in Trans. Linn. Soc. x. 183 (1810).
H. erinacea, Meissn. in Lehm. Pl. Preiss. i. 559 (1845).
H. platysperma, Hook. Ic. Plant. t. 433 (1842).
H. brachyptera, Meissn. in Hook. Kew Journ. iv. 208 (1852).
H. Kippistiana, Meissn. in l. c. vii. 115 (1855).
H. Preissii, Meissn. in Lehm. Pl. Preiss. i. 577 (1845).
H. amplexicaulis, R.Br. in Trans. Linn. Soc. x. 184 (1810).
H. Pritzelli, Diels, in Engler's Botan. Jahrb. xxxv. 163 (1904).
H. prostrata, R Br. in Trans. Linn. Soc. x. 184 (1810). (*H. glabella*, R.Br.)
H. auriculata, Meissn. in Hook. Kew Journ. vii. 116 (1855).
H. cristata, R.Br. Prodr. Suppl. 28 (1830).
H. linearis, R.Br. in Trans. Linn. Soc. x. 183 (1810).
H. stenocarpoides, (F.v.M.) Benth. Fl. Austr. v. 511 (1870).
H. ruscifolia, Labill. Nov. Holl. Pl. Sp. i. 30. t. 39 (1804).
H. verrucosa, F.v.M. Fragm. v. 25 (1865).
H. rhombalis, F.v.M. l. c. x. 90 (1876).
H. purpurea, Hook. in Mitch. Trop. Austr. 348 (1848).
H. arida, Diels, in Engler's Botan. Jahrb. xxxv. 162 (1904).

H. recurva, Meissn. in Hook. Kew Journ. iv. 207 (1852).
H. circumalata, Meissn. in l. c. vii. 114 (1855).
H. commutata, F.v.M. Fragm. v. 26 (1865).
H. strumosa, Meissn. in Hook. Kew Journ. iv. 208 (1852).

Conogynoides.

H. multilineata, Meissn. in Lehm. Pl. Preiss. ii. 261 (1847).
H. laurina, R.Br. Prodr. Suppl. 29 (1830). (*H. eucalyptoides,* Meissn.)
H. obtusa, Meissn. in Hook. Kew Journ. iv. 209 (1852).
H. cinerea, R.Br. in Trans. Linn. Soc. x. 186 (1810).
H. corymbosa, R.Br. Prodr. Suppl. 28 (1830).
H. undulata, R.Br. in Trans. Linn. Soc. x. 185 (1810).
H. petiolaris, Meissn. in Lehm. Pl. Preiss. i. 577 (1845).
H. neurophylla, Meissn. in Hook. Kew Journ. vii. 117 (1855).
H. loranthifolia, Meissn. in Lehm. Pl. Preiss. i. 574 (1845).
H. cucullata, R.Br. Prodr. Suppl. 30 (1830). (*H. Victoriae,* Drumm.)
H. ferruginea, Sweet, Fl. Austr. t. 45 (1828).
H. smilacifolia, Meissn. in Lehm. Pl. Preiss. i. 567 (1845).
H. elliptica, (Sm.) R.Br. in Trans. Linn. Soc. x. 187 (1810).
H. ambigua, Meissn. in Lehm. Pl. Preiss. ii. 260 (1847).
H. falcata, R.Br. Prodr. Suppl. 29 (1830).
H. pycnoneura, Meissn. in Hook. Kew Journ. vii. 117 (1855).
H. stenocarpa, R.Br. Prodr. Suppl. 29 (1830).
H. marginata, R.Br. in Trans. Linn. Soc. x. 185 (1810).
H. myrtoides, Meissn. in Lehm. Pl. Preiss. i. 577 (1845).
H. costata, Meissn. in l. c. 575.
H. oleifolia, (Sm.) R.Br. in Trans. Linn. Soc. x. 185 (1810).
H. florida, R.Br. in l. c. 183.
H. varia, R.Br. in l. c. 183.
H. dolichostyla, Diels, in Engler's Botan. Jahrb. xxxv. 166 (1904).
H. sulcata, R.Br. in Trans. Linn. Soc. x. 180 (1810).
H. Meissneriana, Kippist ex Meissn. in Hook. Kew Journ. vii. 114 (1855).
H. subsulcata, Meissn. in Lehm. Pl. Preiss. i. 555 (1845).
H. Lehmanniana, Meissn. in l. c. i. 557.

Manglesioides.

H. nitida, R.Br. in Trans. Linn. Soc. x. 184 (1810).
H. Oldfieldii, Benth. Fl. Austr. v. 530 (1870).
H. suaveolens, R Br. in Trans. Linn. Soc. x. 182 (1810).
H. lissocarpha, R.Br. in Prodr. Suppl. 27 (1830).
H. bipinnatifida, R.Br. l. c. 28.

11. *XYLOMELUM*, Smith, in Trans. Linn. Soc. iv. 214 (1798).
X. occidentale, R.Br. Prodr. Suppl. 31 (1830).
X. angustifolium, Kippist in Hook. Kew Journ. iv. 209 (1852).

12. *LAMBERTIA*, Smith, in Trans. Linn. Soc. iv. 214. t. 20 (1798).
L. uniflora, R.Br. in Trans. Linn. Soc. x. 188 (1810).
L. rariflora, Meissn. in Lehm. Pl. Preiss. ii. 263 (1847).
L. inermis, R.Br. in Trans. Linn. Soc. x. 188 (1810).
L. ericifolia, R.Br. Prodr. Suppl. 30 (1830).
L. multiflora, Lindl. Swan Riv. App. 32 (1839).
L. echinata, R.Br. in Trans. Linn. Soc. x. 189 (1810).
L. ilicifolia, Hook. Ic. Plant. t. 553 (1843).

13. *STENOCARPUS*, R.Br. in Trans. Linn. Soc. x. 201 (1810).
S. salignus, R.Br. in Trans. Linn. Soc. x. 202 (1810).
S. Cunninghamii, R. Br. Prodr. Suppl. 34 (1830).

14. *BANKSIA*, Linn. fil. Suppl. 15 et 126 (1781).

Oncostylis.

B. pulchella, R.Br. in Trans. Linn. Soc. x. 202 (1810).
B. Meissneri, Lehm. in Lehm. Pl. Preiss. i. 582 (1845).
B. nutans, R.Br. in Trans. Linn. Soc. x. 203 (1810).
B. violacea, Gardner, in Journ. Roy. Soc. W.A. xiii. 62 (1927).
B. sphaerocarpa, R.Br. in Trans. Linn. Soc. x. 203 (1810).
B. tricuspis, Meissn. in Hook. Kew Journ. vii. 118 (1855).
B. occidentalis, R.Br. in Trans. Linn. Soc. x. 204 (1810).
B. littoralis, R.Br. in l. c. 204.

B. verticillata, R.Br. in l. c. 207.
B. dryandroides, Baxter in Sweet Hort. Brit. 350 (1827).
B. Brownii, Baxter ex R.Br. Prodr. Suppl. 37 (1830).

Cyrtostylis.

B. attenuata, R.Br. in Trans. Linn. Soc. x. 209 (1810).
B. Elderiana, F.v.M. et Tate, Bot. Centralbl. lv. 317 (1893).
B. media, R.Br. Prodr. Suppl. 35 (1830).
B. audax, Gardner, in Journ. Roy. Soc. W. Austr. xiii. 63 (1927).
B. Solandri, R.Br. Prodr. Suppl. 36 (1830).
B. Goodii, R.Br. l. c. 36.
B. petiolaris, F.v.M. Fragm. iv. 109 (1864).
B. repens, Labill. Voy. i. 412. t. 23 (1798).
B. prostrata, R.Br. Prodr. Suppl. 36 (1830).
B. grandis, Willd. Sp. Pl. i. 535 (1797).
B. quercifolia, R.Br. in Trans. Linn. Soc. x. 210 (1810).
B. Baueri, R.Br. Prodr. Suppl. 35 (1830).

Eubanksia.

B. dentata, Linn. fil. Suppl. 127 (1781).

Orthostylis.

B. coccinea, R.Br. in Trans. Linn. Soc. x. 207 (1810).
B. spectrum, Meissn. in Hook. Kew Journ. vii. 120 (1855).
B. Menziesii, R.Br. Prodr. Suppl. 36 (1830).
B. laevigata, Meissn. in Hook. Kew Journ. iv. 210 (1852).
B. Hookeriana, Meissn. in l. c. vii. 119 (1855).
B. prionotes, Lindl. Swan Riv. App. 34 (1839).
B. Victoriae, Meissn. in Hook. Kew Journ. vii. 119 (1855).
B. speciosa, R.Br. in Trans. Linn. Soc. x. 210 (1810).
B. Baxteri, R.Br. Prodr. Suppl. 36 (1830).
B. praemorsa, Andrews, in Rep. Bot. t. 258 (1802). (*B. marcescens*, R.Br.)
B. Lemanniana, Meissn. in Hook. Kew Journ. iv. 210 (1852).
B. Caleyi, R.Br. Prodr. Suppl. 35 (1830).
B. Lindleyana, Meissn. in Hook. Kew Journ. vii. 120 (1855).
B. elegans, Meissn. in l. c. 119.
B. Candolleana, Meissn. in l. c. 118.

Isostylis.

B. ilicifolia, R.Br. in Trans. Linn. Soc. x. 211 (1810).

5. *DRYANDRA*, R.Br. in Trans. Linn. Soc. x. 211. t. 3 (1810).
D. quercifolia, Meissn. in Hook. Kew Journ. iv. 210 (1852).
D. praemorsa, Meissn. in Lehm. Pl. Preiss. ii. 265 (1847).
D. cuneata, R.Br. in Trans. Linn. Soc. x. 212 (1810).
D. falcata, R.Br. in l. c. 213. (*D. Dorrienii*, Domin.)
D. armata, R.Br. in l. c. 213.
D. longifolia, R.Br. l. c. 215.
D. Fraseri, R.Br. Prodr. Suppl. 39 (1830).
D. floribunda, R.Br. in Trans. Linn. Soc. x. 212 (1810).
D. carduacea, Lindl. Swan Riv. App. 33 (1839).
D. carlinoides, Meissn. in Lehm. Pl. Preiss. ii. 267 (1847).
D. polycephala, Benth. Fl. Austr. v. 570 (1870).
D. Kippistiana, Meissn. in Hook. Kew Journ. vii. 122 (1855).
D. squarrosa, R.Br. Prodr. Suppl. 38 (1830).
D. serra, R.Br. l. c. 38.
D. concinna, R.Br. l. c. 38.
D. foliolata, R.Br. l. c. 38.
D. stupposa, Lindl. Swan Riv. App. 33 (1839).
D. nobilis, Lindl. l. c. 33.
D. mucronulata, R.Br. in Trans. Linn. Soc. x. 213 (1810).
D. formosa, R.Br. l. c. 213. t. 3.
D. Baxteri, R.Br. Prodr. Suppl. 38 (1830).
D. nivea, R.Br. in Trans. Linn. Soc. x. 214 (1810).
D. aretotidis, R.Br. Prodr Suppl. 39 (1830).
D. nana, Meissn. in Hook. Kew Journ. vii. 121 (1855).
D. Preissii, Meissn. in Lehm. Pl. Preiss. i. 599 (1845).
D. sclerophylla, Meissn. in Hook. Kew Journ. vii. 123 (1855).
D. pulchella, Meissn. in l. c. iv. 211 (1852).

D. plumosa, R.Br. in Trans. Linn. Soc. x. 214 (1810).
D. senecüifolia, R.Br. Prodr. Suppl. 39 (1830).
D. erythrocephala, Gardner, in Journ. Roy. Soc. W. Austr. xiii. 63 (1927).
D. vestita, (Kippist) Meissn. in Hook. Kew Journ. vii. 121 (1855).
D. cirsioides, Meissn. in l. c. iv. 211 (1852).
D. Purdieana, Diels, in Engler's Botan. Jahrb. xxxv. 174 (1904).
D. Gilberti, S. Moore, in Journ. Linn. Soc. xlv. 211 (1920).
D. Hewardiana, Meissn. in Hook. Kew Journ. iv. 210 (1852).
D. patens, Benth. Fl. Austr. v. 578 (1870).
D. conferta, Benth. l. c. 578.
D. horrida, Meissn. in Hook. Kew Journ. iv. 211 (1852).
D. serratuloides, Meissn. in l. c. vii. 123 (1855).
D. comosa, Meissn. in. l. c. iv. 211 (1852).
D. Shuttleworthiana, Meissn. l. c. vii. 122 (1855).
D. speciosa, Meissn. in l. c. iv. 211 (1852).
D. tridentata, Meissn. in l. c. vii. 120 (1855).
D. tenuifolia, R.Br. in Trans. Linn. Soc. x. 215 (1810).
D. proteoides, Lindl. Swan Riv. App. 33 (1839).
D. runcinata, Meissn. in Hook. Kew Journ. iv. 210 (1852).
D. obtusa, R.Br. in Trans. Linn. Soc. x. 214 (1810).
D. bipinnatifida, R.Br. Prodr. Suppl. 39 (1830).
D. pteridifolia, R.Br. in Trans. Linn. Soc. x. 215 (1810).
D. calophylla, R.Br. Prodr. Suppl. 40 (1830).

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